- Starch and dextrin adhesives
- On- or off-machine coating?
- Proportioning pumps for accurate metering
- Processing of wood flour

TECHNOLOGY DEPARTMENT

The Paper Industry

IN TWO SECTIONS—SECTION II

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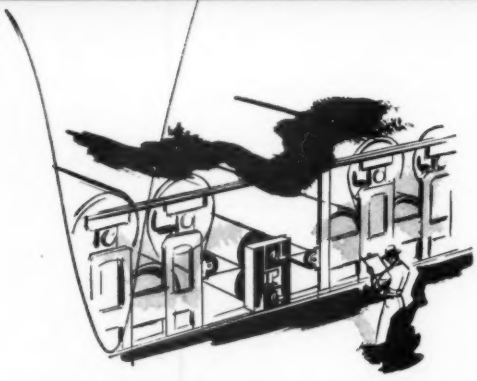

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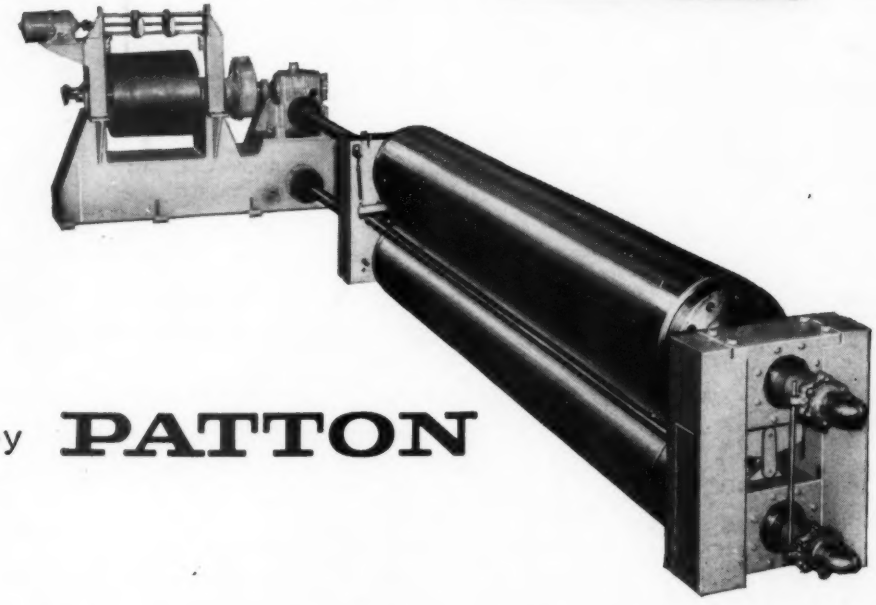

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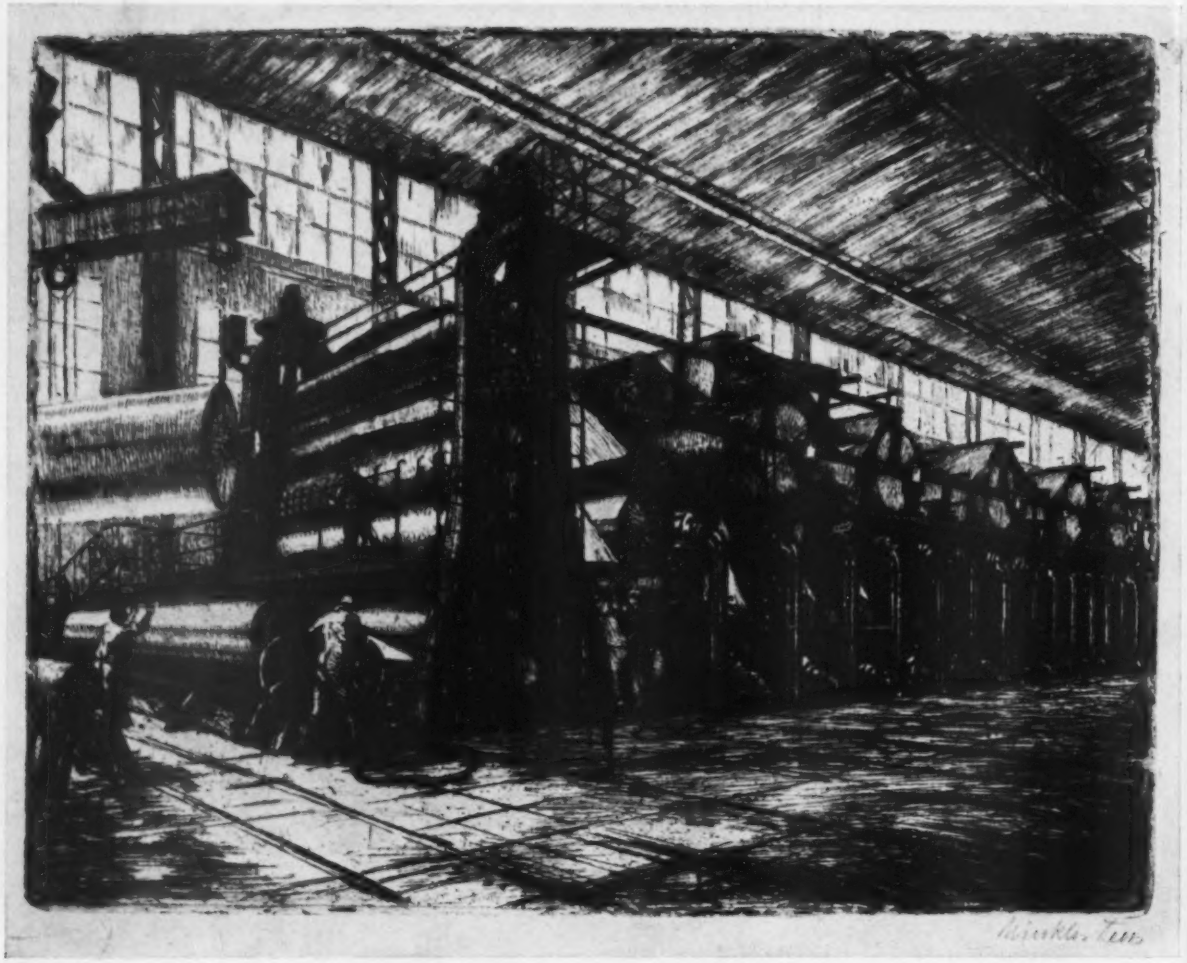

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The Paper Industry

Technology • Engineering • Management • Production

VOLUME 41 **NUMBER 1** **April 1959**

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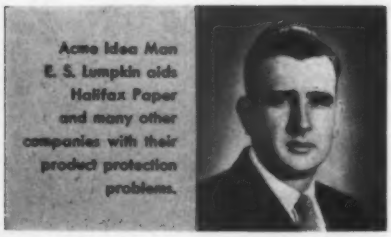

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From our point of view..

Our next 40 years of service

With the April, 1959, issue, The PAPER INDUSTRY enters its 41st year of devoted service to the pulp and paper industry.

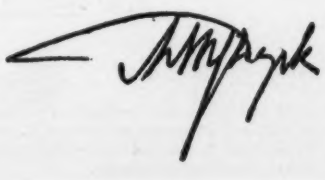
In retrospect of this publication's 40 years of service, we hope to have succeeded in establishing a strong identity with this industry and in providing the unqualified service expected by the readers of this publication.

In preview of the next 40 years of service to this industry, we are even more determined to keep abreast with new developments and disseminate needed information — without recourse to redundancy — for the benefit of the pulp and paper manufacturing industry. Our editorial program will of necessity put emphasis on the scientific, technical and engineering contributions that will be the foundation for this country's strength and industrial growth. That such a program is now an absolute must is being recognized by all responsible members of a free society that can no longer permit itself the luxury of mental complacency. The need has become urgent for new ideas — for creative thought and action — and for hard work.

The PAPER INDUSTRY in the last five years has cleared its decks for effective operation in the years ahead. This entailed a complete change of reader audience, with the result that the magazine now reaches the individuals who control and set the pace of this industry's operation and growth. The publication now goes to managers, technical men, engineers and superintendents in 962 pulp and paper manufacturing establishments in the United States and Canada — which, for all practical purposes, means a 100 per cent coverage of the pulp and paper industry.

We have further succeeded in selecting an intelligent and efficient team of representatives operating in major industrial centers. Their special function will be to keep in close contact with the allied industries and interpret the objectives of this publication where necessary.

All this means that this publication is geared for effective service and growth. But it would be presumptious on our part to say that we can achieve these objectives without help. Maximum progress can come only from a cooperative effort involving our publications, our readers and our advertisers. We need an unimpaired flow of communications between our publications, our readers and our advertisers. We need the constructive criticism of our readers and we need, of course, an ever growing acceptance of this publication as an advertising medium by the suppliers of equipment and materials to this industry.



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1

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Automotive Parts Mfr	reciprocating pump bearings	plain	wet	Pumping chemicals. O.K. after one month. Previous grease caused about one bearing failure per week.
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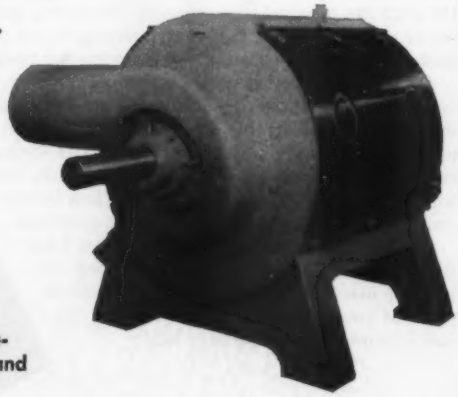
- — an accessible rejects outlet for tailings inspection or sampling.



These features are resulting in peak capacities and high discharge consistencies at lowest horsepowers. Reject richness is readily controlled. Engineered simplicity is characteristic of the entire line of Impco Centrifugal Screens which require very little operating attention and mechanical maintenance.

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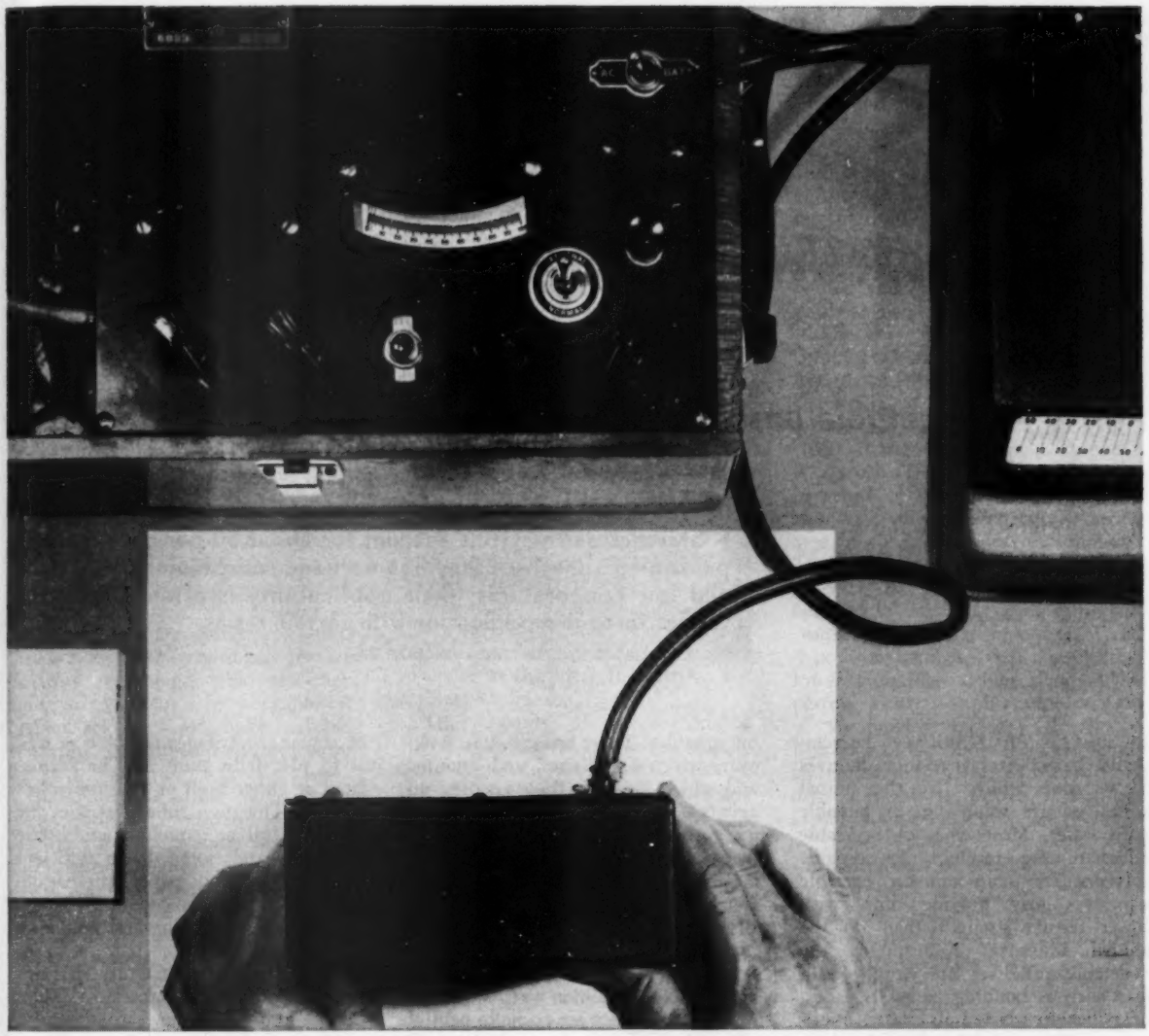

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Adhesives in the paper industry

Part V — Vegetable-base adhesives — starch and dextrin adhesives

Starches and dextrins account for about 50 per cent of all packaging adhesives; they age well and resist high humidities and low temperatures; their applicability is extended even further through modification with certain resins.

MODERN PACKAGING Encyclopedia characterizes vegetable adhesives as a group which, like the animal adhesives, are soluble in or miscible with water. Most types of vegetable adhesives are insoluble in organic solvents. The more common vegetable adhesives may provide films with lower tensile strength than do the animal adhesives. Accordingly, the vegetable adhesives are employed in uses such as bonding paper to paper, or paper to glass and related applications. They may be formulated so they will stick to inks, varnishes and resin-coated surfaces, although in the unformulated state they do not do this as well as the animal adhesives. The vegetable adhesives comprise the most important class of packaging adhesives from the point of view of volume. They may be classified (8) in the following categories: gelatinized pastes, jelly gums, borated dextrins, unborated dextrins and vegetable gums, such as gum arabic. These are derived primarily from starch, natural gums, and mucilages. In addition to these, other categories may now be added, the most important of which are derived from vegetable proteins and from cellulose.

Many pastes are "short" buttery compositions which tend to "break" on agitation. There are varieties, however, which are "long" and gummy, and which maintain their viscosity on agitation. Other pastes may be semi-fluid and soft. If they are borated, that is, if they have been treated with borax, they may be quite fast setting. If they are unplasticized, they are slightly resistant to moisture and to high humidity and sterilization temperatures. The heavily plasticized pastes have good non-warp qualities. Most of the pastes are acidic to neutral although, if they are borated, they will be alkaline.

Pastes are used in the packaging industry for adhering bag bottoms, hand labelling on a variety of surfaces, lap pasting, mounting, laminating convolutes, tube winding, end sealing and for cup winding.

The jelly gums are rubbery, gummy materials which are characterized by a high degree of cohesiveness. This actually limits their application. They have a degree of moisture resistance and good resistance to high humidity and to sterilization. They adhere well to several substrates and do not tend to crystallize. If they are alkaline, they have improved stability and adhesion especially to oily and greasy glass surfaces. If they are on the acid side, they have better color. Composition, of course, contributes to color as well as to pH. Jelly gums may be formulated at either high or medium solids content. The high solids varieties are used for full or semi-automatic bottle labelling, and some have sufficient adhesion for foil paper lamination. The medium solids compositions are used for hand labelling and gumming operations.

The borated dextrins vary in color from white to dark brown. As their name indicates, they comprise a mixture of dextrin and borax. These adhesives are fluid and quite fast setting. They may be made into paste by formulating so that they have a short, buttery consistency. The borated dextrins have good final adhesion and a fair degree of resistance to high humidity. Their consistency is normally medium to thin in order to assure proper spreading characteristics. Their pH is alkaline, because of the borax present.

The borated dextrins are used for case and carton sealing, for tube winding, for tight wrapping, for bag seams, laminating, sizing, wrapping, for folding boxes, for lap paste, or bag sealing, and for labeling.

The unborated dextrins are among the best known types of vegetable adhesives because of their use on en-

velopes. They are usually brown in color and, if unplasticized, they are fluid, fast drying compositions with high solids content. They are important where high initial tack and fast drying are important. They are usually of acid pH and may be modified for reasonably good non-curl properties. Special formulations are available for back seams and glass windows and these are slow drying and have a good lay flat adhesion. In addition to the applications indicated, they are used for stencil gums, carton sealing, bottle labelling, remoistening adhesives on gummed labels and stamps, and as a cold pick-up gum for can labelling.

Gum arabic is a typical example of the last category and is characterized as a light colored, fast drying glue. It is not as "short" as most dextrin products and is less sensitive to blocking under conditions of high humidity than most unborated dextrins. Gum arabic is used for wrapping stencil operations and as the "tropical front seal" for envelopes to resist blocking.

As already indicated, the bulk of the packaging adhesives used today come from the group of vegetable adhesives. The bulk of the vegetable adhesives in turn are starch products or products derived from starch, such as dextrins. Advantages which the packaging industry finds in vegetable adhesives are low cost, machineability, versatility, lack of odor and non-toxicity.

To summarize, as the above classification indicated, vegetable adhesives can be formulated with strong tack and with remoistening properties where required. Their physical properties, as indicated above, vary from thin fluids to pastes and their pH covers the entire gamut. Where color is important, light colored adhesives are available and these may be tinted in order to obtain a matching glue line.

The storage characteristics of most vegetable adhesives in the dry state is excellent and liquid formulations also may usually be stored for many months. The good machining properties of most vegetable adhesives make them valuable to the packaging industry and their performance characteristics are not markedly altered by variations in temperature and humidity. Clean-up operations and "build up" on the roll are readily handled because of the water solubility of the glues.

In these days when speed of operation is so important, it is not unusual to modify vegetable adhesives with resin adhesives particularly urea-formaldehyde and phenol-formaldehyde copolymers and with polyvinyl acetate emulsions. In this way, improved speed of operation results along with adhesion to the more difficult surfaces. Also, better water resistance and, in some instances, better non-blocking properties may be expected. Lay flat properties and humidity resistance may also be improved.

*Starch and dextrin adhesives**

Starches and dextrins provide the base for the largest single group of adhesives used in the packaging industry. They account for about 50 per cent of all packaging-adhesives production and, in common parlance, the term vegetable adhesive generally refers to starches or dextrins. A wide variety of natural starches are used, mostly from corn, and to a less extent from tapioca, potato, wheat, rye, sago, cassava, waxy maize and sweet potato. In addition to starches, flours which are combinations of starches and proteins are also used as adhesives.

The basic raw materials may be subjected to a number of chemical reactions in order to modify such properties as solubility, tack and adhesiveness. In turn, these modifications may be blended with a wide variety of additives, with the net result that the adhesives chemist has numerous combinations at his disposal in order to arrive at the ideal formulation for a given application.

The viscosity of an unmodified starch when cooked in water is usually quite high and the solids content is low at usuable viscosities. Although this form of the adhesive is useful for certain applications, there are others where lower viscosity and high solids are required. For these applications, the starch is hydrolzyed either by enzyme treatment or by acid treatment to yield "thin boiling" starches for application as label and bag pastes.

For very high solids and quick tack, and for adhesives with good machining properties, the answer is usually found in dextrinization. This is a process whereby the starch chains are not only broken to provide lower molecular weight molecules but also, in several types of dextrinization, the structure of the resulting fragments is changed to give a product of superior colloidal properties. Because of their much lower molecular weight, many dextrins are completely water soluble rather than water dispersible, as is starch. Literally thousands of different types of dextrins are known, and the adhesives chemist can choose from these to arrive at the required machineability, viscosity and solubility.

*Much of the material under this section, as well as in the preceding introductory discussion, was extracted from *Modern Packaging Encyclopedia.*

Plasticizers and solvents are frequently included in the formulation to achieve special effects relative to penetration into the substrate, specific adhesion, viscosity or body and flexibility. For optimum performance, the tapioca dextrins are normally employed since these maintain their viscosity more uniformly on aging. Corn dextrin, on the other hand, is lower in cost and has adequate properties for most adhesive uses. The starch and dextrin-based adhesive age well and resist high humidities and low temperatures. The modification of starch and dextrin adhesives with resins like polyvinyl acetate has extended even further the applicability of these materials.

The chemistry of starch is quite complex, for like the gums and cellulose to be discused, it is a polysaccharide in which approximately 1000 hexose units are linked together in a chain. In starch, the only hexose unit is glucose. The chains may be either branched or linear, and actually, the two types of polymers may be separated by their differences in solubility. The straight chain materials are known as amylose. Amylose is believed to consist of a series of glucose rings bonded at the carbons 1 and 4 positions. Amylose has considerably lower molecular weight than amylopectin, which is a branched version of the amylose molecule. Here, the backbone of the polymer is believed to be similar to amylose, with branching originating at the carbon 6 positions in the glucose units.

Classification of starch adhesives

Lee, in DeBuryne and Houwink, provides the following classification for starch-based adhesives:

A. Dextrins
  1. White dextrins
  2. Canary dextrins
  3. British gums
B. Acid hydrolyzed starches
C. Enzyme degraded starches
D. Oxidized starches
E. Gelled starches
  1. Alkali gels
  2. Salt gels
F. Water-soluble starch derivatives

Dextrins

The discussion which follows will use Lee's classification as a basis. Thus, dextrins, as the classification indicates, exist in at least three different grades. Dextrins are produced by the heat degradation of starch under a variety of conditions. White dextrins result when the roasting or heating is carried out at a relatively low temperature in the presence of an acid catalyst. The water-soluble content and viscosity of

white dextrins cover a wide range permitting their use at concentrations from 25-55 per cent solids.

Canary dextrins are produced by the same method with the exception that the process is continued for a longer time, at a higher temperature and in the presence of a smaller quantity of catalyst. Because the roasting period is quite extensive, solutions of canary dextrins may vary in color from light to dark yellow. Being relatively thin-boiling, canary dextrins may be made up in 50-65 per cent solutions which remain stable for months. Their tackiness and fast-drying properties make them very adaptable for use in adhesives.

British gums result when the time of roasting is still further prolonged and the quantity of catalyst decreased. Their color varies from light to dark. These gums are quite stable and have good film forming properties.

The conversion process by which dextrins are made involves the control of many variables. For this reason, the resultant product is really a combination or mixture of products meeting the required average specifications, but containing some under-converted and some over-converted components. New dextrinization processes have been developed that reduce these non-uniform portions to a minimum.

Properties of dextrins and effects of additives

Certain properties of dextrins are especially significant when they are to be used as adhesives. Particularly important is the fluidity of the paste or solution—both alone and after borax has been added. Other important properties are percentage of water-soluble components and pH. Color is also significant in some applications.

In general, the dextrins tend to have the same type of solubility characteristics as their parent starches with, of course, the obvious difference that they are much more soluble. If, however, the dextrin comes from a starch which has a high straight chain amylose content, like corn starch, it will give a plastic or pasty type solution or dispersion in water. Tapioca dextrin, on the other hand, behaves much more as one would expect a long branch amylose fraction to behave, providing a solution which retains its viscous character. Both corn and tapioca have amylose contents of about 25 per cent, with the difference that tapioca has longer branch chains in the amylose fraction.

Dextrins may be formulated in a variety of fashions to achieve a final adhesive. If a partially soluble dextrin is involved, it is heated in water suspension in order to achieve solution. Addition of alkali to a dextrin solution increases the latter's viscosity, resulting in an adhesive which will soak less readily into porous surfaces. Thus, such adhesives are important in boxboard applications. A variety of salts including sodium carbonate, phosphates of various types, sodium tetraborate (borax), sodium silicate and sodium silicate and sodium nitrate are used with dextrins to change the pH, viscosity, adhesion and drying rate. If hygroscopic films are desired, calcium nitrate or calcium chloride may be included in the formulation. A wide variety of hydroxyl-containing materials including invert sugars, sorbitol, glycerol or diethylene glycol may be used as plasticizers. Urea and acetamide also serve as plasticizers. Organic acids such as citric, lactic, tartaric and glycollic are used to improve the adhesion of the dextrins for hard-surfaced papers, whereas salts of organic acids such as sodium lactate or sodium citrate are plasticizers.

The addition of organic solvents may alter the penetrating properties of dextrin and may cause the adhesion to decrease. Such materials include cellosolve, dioxane and diacetone alcohol. Borax is widely used with dextrins because it increases the speed of adhesion. The borax serves to "gel" the adhesive film at a lower solids concentration. Thus, in the presence of borax, less water must evaporate from the adhesive film before the adhesive character is demonstrated.

Dextrins must be carefully chosen and formulated for use where curling is undesirable. Curling is caused by film shrinkage on drying. Also, the adhesive must be formulated at a high solids content so that little change in volume will take place on drying.

There do not appear to be too many good plasticizers for dextrins. Urea is the best plasticizer and is widely used with dextrins. The inclusion of hygroscopic agents such as the carbohydrate materials has a plasticizing effect. These serve as humectants and allow the dextrin film to achieve equilibrium with the moisture in the atmosphere. On the other hand, the presence of moisture does promote blocking.

Dextrins usually carry over from their parent starches a tendency to become plastic when water dispersions are aged. This characteristic of becoming pasty is undesirable and, accordingly, small amounts of sodium hydroxide are frequently added during the dispersion of the dextrin in water. Sodium chloride and sodium nitrate appear to accomplish an effect similar in some respects to that of urea, formaldehyde and dioxane.

This tendency towards plasticity is greatest with the least modified or white dextrins. Among the additives used to fluidify "pasty" adhesives from white dextrins are urea, sulfonated tallow, colloidal clays, undegraded starch and natural gums like tragacanth or their synthetic equivalents like carboxymethyl cellulose.

Acid hydrolyzed starches

Dextrinization is normally a "dry" process. Most of the other methods for modifying starches are "wet" processes. Thus, the acid modification of starch—producing a series of thin-boiling starches—is usually effected by making a slurry of the starch in water and adding a strong mineral acid, such as sulfuric acid, at a concentration which has previously been determined as desirable. The slurry is then heated at a temperature below the gelatinization point of the starch in order to bring about an acid hydrolysis of the starch molecule. When the desired decrease in viscosity has been achieved, the acid is neutralized. The resulting products provide plastic adhesives, and the degree of plasticity is determined by the extent of hydrolysis. The more the hydrolytic cleavage, the softer the resulting paste. If, on the other hand, these acid modified starches are made quite alkaline, viscous liquid adhesive result.

Enzyme converted starches

The controlled use of enzymes provides still another method for hydrolyzing starch. Commercial enzyme preparations normally used contain α- and sometimes β-amylase. α-Amylase is the preferred enzyme constituent since it brings about a random type of hydrolysis rupturing the starch molecule at intervals along the chain to obtain irregularly sized fragments. β-Amylase, on the other hand, appears to take off two glucose units at a time, thus liberating the di-saccharide maltose. Excessive quantities of sugars are seldom desirable, for which reason, enzyme manufacturers now supply the paper industry with products which contain only α-amylase.

Hydrolysis by enzymes is carried out on water slurries of starch at temperatures sufficiently high to gelatinize the starch. At lower temperatures, the enzymes are not effective. This means that relatively low concentrations of starch are used since it is difficult to agitate the gelled structure. Various techniques are available for making possible the use of higher concentrations. These include using mixtures of starch and dextrin and adding urea in the

(Continued on page 24)

Paper and board coating — on- or off-machine?*

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Many factors are interrelated and should be considered in determining the merits of on- vs. off-machine coating for any set of conditions.

TO REVIEW certain requirements of the coating operation and the circumstances surrounding its installation, an analysis of the relative merits of on- vs. off-machine units at each point should provide a reasonable basis for decision. It must be appreciated that many factors are interrelated and that the overriding considerations are generally those of cost (installation and operation), quality and versatility.

Speed, trim and number of machines

A new and properly designed machine can accomplish any desired quality range of coated paper or board at minimum cost through on-machine coating. Therefore this type of operation will not be discussed here.

Where more than one paper machine is being considered, and their speed is not excessive or their trim significantly different, an off-machine coater requires careful study. Such a unit, operating at 2000-2500 fpm, may well be capable of handling the full production from two or more such machines.

An off-machine unit is generally more expensive than a single on-machine unit. That is because of the need for external drive, control mechanisms, unwind and flying pasters, complicated drying systems, frames, carrying rolls, etc.

The simplicity of the coating head, the relative ease of installation by virtue of machine layout are factors affecting on-machine installation costs.

Operating costs of off-machine units (because of the need for handling rolls, threading and wash-ups) usually exceed those of on-machine coaters. These same operations are handled by the paper machine crew on machines making on-machine coatings.

Paper machine layout

The paper machine layout can materially affect the cost of an on-machine coater installation, as well as the quality of the coating. The type of coater unit selected for the job determines the machine changes which have to be made.

In the case of board, space between calenders may be adequate for the coater installation. In other instances, a size press may have to be removed to make way for the coater. It may even be necessary to move an entire section of the dryers and winders, or install additional drying capacity at the end of the machine. However, building limitations frequently prevent this type of installation without high rebuilding costs.

Off-machine installation, on the other hand, may require an entirely new building for equipment and roll handling facilities.

The engineering and technical staffs, of the mill making the installation in co-operation with qualified equipment suppliers, can best determine the relative costs and quality potentials of each type of operation.

Order patterns and grade range contemplated

Order patterns and the range of grades contemplated may have a significant effect in determining the type of coating installation. It is generally conceded that furnish changes on a machine are accomplished with more difficulty and at greater expense than are changes in coating or coating weight, etc., on a coater itself. Assuming changes are required at the coater only, any down-time of the coater will result in paper machine down-time as well.

The mill, which operates on small orders of a diverse nature, should produce base stock, perhaps, in quantities sufficient to store for subsequent off-machine coating. In today's market where inventories are maintained at low levels by the customers, this practice may become more of a factor.

The off-machine installation simplifies scheduling and reduces down-time. It also provides better service for the customers.

Where few, if any, changes in grade are contemplated, and orders are of substantial size, it may be difficult to justify an off-machine installation, except as weighted by factors already mentioned.

Drying capacity of paper machines

Drying capacity of the paper machines and other drying considerations must be related to machine layout and quality considerations. One item of interest, frequently overlooked, is that for the same basis weight structure, paper machine drying requirements for coated papers are less than for non-coated papers. This is because of less fiber weight.

(Continued on page 24)

*Abridged from a paper presented at the 39th Annual Convention of the American Pulp and Paper Mill Superintendents Association.

Proportioning pumps in the pulp and paper industry

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▶ The continuing demand for accurate metering of chemicals in the pulp and paper industry has widened the scope of applications of proportioning pumps.

APPLICATION of proportioning pumps in the pulp and paper industry finds wide usage. The demand for accurate flow rates together with diversity of applications has been adequately met by the use of proportioning pumps.

Various locations in the manufacture of paper where proportioning type pumps find usage is in the following:

1. Treatment of the pulp stock
2. Prevention of foaming
3. Coloring of the paper
4. Injection of chemical coating agents into the coater
5. Metering of other chemical reagents such as pitch dispersants and biocides.

A typical diagram of these various applications is illustrated in Fig. 1.

The chemical proportioning pump (also known as the "controlled volume pump") has achieved successful application through the ingenuity of the paper mill operators who are continually striving to produce better quality through the best economical methods. By presenting factual conditions of application to the pump vendor, improvements have been made resulting in more accurate methods of control heretofore considered beyond reasonable expectations. The proven results gained by these methods is a closer control of the quality of the finished product.

As shown in Fig. 1, one of the applications involved in the paper making industry is the addition of alum. Proportioning pumps have been applied for the injection of alum in water and waste treatment. Prior application experience of proportioning pumps in metering alum in water waste treatment systems has been very valuable in correctly applying the proportioning pump in alum service in paper manufacture. This knowledge was applied to guide selection of pumps materials of construction as well as methods for handling alum in the liquid form. A typical application involves the accurate metering of alum for the treatment of petroleum wastes. This typifies the experience that was drawn on to successfully apply the proportioning pump for metering other paper making chemicals such as sodium aluminate, the phosphates, sodium silicate and others.

Experience has shown reliable accuracy in proportioning pumps depends upon:

1. Chemical resistance of materials of construction to the fluid pumped.
2. Proper sizing of the pump to meet capacities and pressure requirements.
3. Close evaluation of the over-all metering system in order to select the proper auxiliary equipment necessary to insure successful operation.

Information helpful in meeting these above objectives are:

Selection of materials: Full knowledge of the chemical to be pumped should include temperature and physical characteristics.

Sizing of the pump: Besides determining metering rates and discharge pressures, other points should also be explored, i.e. whether or not two or more pumps driven by a common motor may be satisfactory. Frequently a multiple feed pump (duplex, triplex, quadruplex, etc.) ganged will be more economical than a single feed pump.

Another point to consider in sizing the pump is the adaptability of future reagent heads to the pump. This point should be considered at the time of specification so that the design of the pump provides for the adding of reagent heads.

Electrical characteristics of the motor must also be considered. If the driving means for the pump is other than by electric drive, availability of items such as steam pressure for turbine drive, air pressure for air drive, etc., should be specified.

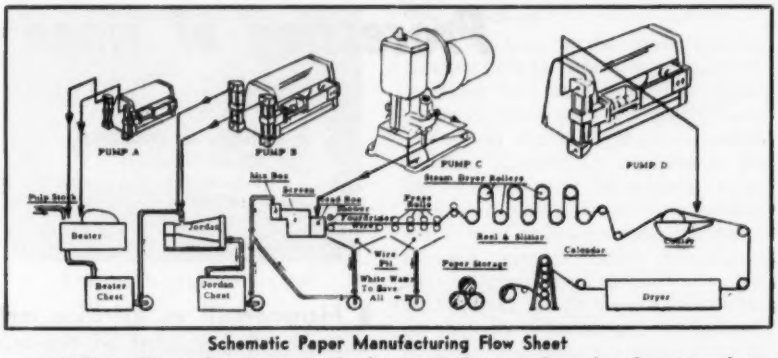
Auxiliary equipment

Accurate metering of chemicals in the pulp and paper industry sometimes requires the use of auxiliary equipment. The purpose of such equipment is to assist in the pumping of these chemicals at accurate flow rates. This point is illustrated by Fig. 2, a typical metering system for treatment of boiler water with phosphates. The auxiliary equipment essential to this system is a properly designed mixing tank equipped with an agitator; other items to be used in conjunction with the tank are a mixing basket, strainer, low level alarm, three way flush valve, etc. Effective metering of chemicals such as phosphates, sulfites, alum, etc. require the use of some of the auxiliary equipment cited above. This demand has led to the development of "Package units" specifically to combine proportioning pumps with auxiliary equipment into one chemical metering system.

A typical application of bleach liquor preparation, Fig. 3, summarizes a method by which the paper mills use proportioning pumps to achieve a low-capacity flow control requirement. This metering system has distinct advantages in that:

1. The system is continuous which eliminates the requirement for large storage tanks.
2. The metering rates may be easily changed in proportions to one another for change in bleach formula.
3. The control is automatic.

The continued demand for the accurate metering of chemicals in the pulp and paper industry has widened the scope of proportioning pumps. The pulp and paper industry can look forward to increased assistance from chemical proportioning pump manufacturers for better metering systems that have the ultimate objective of assisting the mill operator in his efforts to produce a higher quality paper.



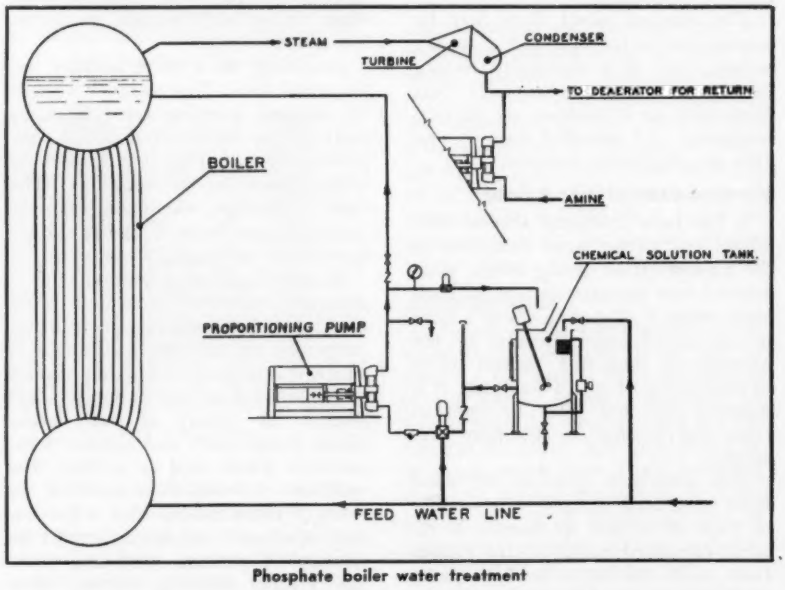
Schematic Paper Manufacturing Flow Sheet

PUMP A: Chemical metering to the beater: 1. Paper makers alum for pH and size control; 2. Starch to increase sheet strength and wire retention; 3. Pitch dispersants (phosphates, amines, etc.) to prevent pitch coagulation; 4. Sizing reagent (gums, resins, waxes, etc.) to promote paper strength, improve color fastness, etc.

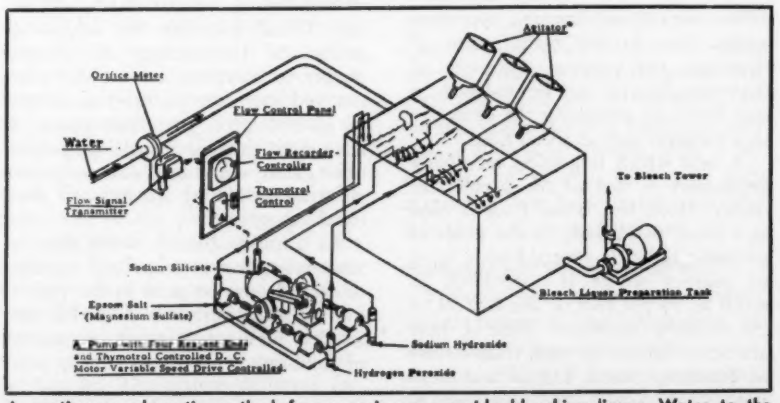
PUMP B: Chemical metering to the jordan: 1. An antifoam to depress foam formation; 2. A biocide to control micro organism growth in the screens, felt blankets of the press rolls, dryers, etc.

PUMP C: Precision control of dye addition.

PUMP D: Reliable and accurate metering control of coating chemicals.



Phosphate boiler water treatment



A continuous schematic method for preparing a peroxide bleaching liquor. Water to the preparation tank is metered at a rate as required by the process demand. The water rate is measured by the orifice flow meter from which a pneumatic signal (3-15 psi) is transmitted to a flow control panel which sets the output speed of the thymotrol-controlled variable speed dc motor driving the pump with four reagent ends each metering the chemicals in proper ratio for a specific bleaching formulation.

Processing of wood flour

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Hammermill vs. attrition mill in wood flour production is discussed; 40 per cent of the wood flour in the U.S.A. is used in linoleum manufacture.

THE PRODUCTION of wood flour represents a relatively complex process with each installation requiring independent engineering.

The uses of wood flour may be summarized as follows: (1) as an absorbent, (2) as a chemically-reacting substance, (3) as a chemically inert filler, (4) as a modifier of physical properties, (5) as a mild abrasive, and (6) as a decorative material.

Various uses of wood flour

It has been estimated that at least 40 per cent of the wood flour used in the United States during recent years entered into the manufacture of linoleum where it is used chiefly as a filler in the inlaid types. Because of the necessity of imparting various colors to the figures of inlaid linoleum, it is essential that the filler be light in color and capable of absorbing pigments.

The absorbent qualities of wood flour have been utilized in a number of ways. It is used in cleaners to remove unwanted water, oils or greases from such articles as machine parts, jewelry and furs. It is also used as a carrier for certain cleansing poisonous agents, etc. In the manufacture of dynamite, the extreme sensitivity of the nitroglycerin can be reduced to safe levels by absorbing the explosive in a medium such as wood flour.

A field which is gaining increasing importance is that of the plastics industry. Here, too, wood flour is used as a filler, particularly in the fields of phenolic and urea-formaldehyde types of plastics where it contributes as much as 50 per cent of the content of the molding compound. Some of these are better known by such trade names as Bakelite, Durez, Durite and Resinox.

Wood flour is also mixed with a binder such as starch or glue and molded into picture frames, phonograph records, dolls, etc. Another type of common application is the plastic wood used for filling cracks, crevices and repair of furniture. Other applications are in the manufacture of glues when mixed with phenol and urea-formaldehyde resins.

Insulating brick offers another use for wood flour. This material is made of clay and granular wood flour, by pressing the bricks to size and subjecting them to high temperature in order to burn out the wood flour. The small air pockets which constitute the insulating properties of the bricks are thus left in the kaolin.

In these applications, wood flour is generally considered as an inert material chemically, modifying the physical properties of the other materials in which it is dispersed. The low density of the wood flour and its fluffy nature reduces the density of many heavy plastic components and similar dense materials when used as a filler. The inclusion of wood flour modifies the strength characteristics and is particularly effective in increasing impact resistance of plastics, rendering them less brittle, reducing stresses setup during cooling and minimizing shrinkage. Wood flour has the additional ability of transmitting an opaque quality to otherwise transparent plastics and therefore provides a method of color control. In certain paints, it is used to provide insulating properties against sound and also to impart electrical insulating qualities to electrical equipment.

As a mild abrasive wood flour is sometimes used in soaps and cleaning of furs. It can be used in the polishing of small objects such as buttons, molded plastic articles, etc. by means of tumbling.

What is wood flour?

Essentially wood flour is made up of finely ground wood particles or fragmented cell bundles which may on further reduction separate into battered fragments of single cells. It is difficult to set a firm specification on the particle size of wood flour. It usually varies from a coarse extreme of all minus 40 mesh to more common specifications of minus 100 mesh or quite often 200 mesh. Other specifications which must be varied for the particular application are resin content, color, specific gravity and absorptiveness.

Wood flour is made from both hardwoods and softwoods. Of the softwoods, white pine is predominantly used. There are very few applications of yellow pine due to the high resin content. Other materials commonly used are aspen, spruce and hemlock. Of the hardwoods, maple is perhaps one of the more common.

The moisture content of wood flour is of prime importance, especially during the production where it influences the horsepower requirements for grinding, affects the sifting ability and to some extent limits the fineness of grind. For these reasons, many wood flour processors utilize dryers in their system if the feedstock is not initially a dry and readily grindable stock.

Wood flour systems

Essentially, wood flour production systems consist of a multistage reduction in which shavings or chips are reduced in a pregrinder and then pulverized to a flour in a double runner attrition mill. Usually pregrinding to a finer mesh than 20 or 30 is not considered economical. The final grinding is done with a considerable recycle load, often referred to as "run around". This run around, if excessive, can result in unusually high power consumption and make necessary the use of larger size units. However, an extremely small run around is equally inefficient, indicating a subcapacity feed rate. Perhaps one of the

most critical phases in this operation is selecting an efficient balance of in-range flour produced per pass and the subsequent recycle or run around.

System used at Holt Hardwood Co.

Typical of such a system and perhaps one of the most modern is that installed at the Holt Hardwood Co., Oconto, Wis. This system was designed for the production of 2,000 lbs. per hr. of minus 80 mesh wood flour, with maple shavings used as the starting feedstock. The system may be briefly summarized as follows:

The stock is brought from the planing mill by means of a standard products collecting system and preground in an 18-in. 30-hp hammermill. The stock is then conveyed to a storage silo or a distributing conveyor for immediate use in the process. The distributing conveyor provides a feed to three rotary knife cutters, which produce an 8-mesh and finer material. The coarse material is screened out and and fed to the double head attrition mill.

The Sprout-Waldron 36-in. double runner attrition mill, with two 75-hp. shaft-mounted 1800-rpm motors, is the heart of this system. The stock from this mill is conveyed by means of a negative pressure pneumatic system to a reel where the minus 80 mesh material is removed and sent to the packaging section.

Other systems

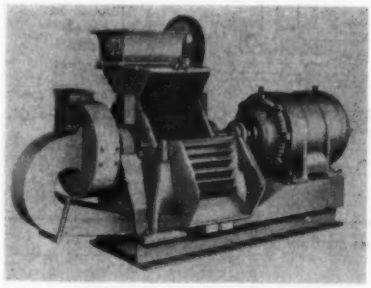
Another system is designed for the use of softwood wastes as feedstocks. It is for the production of 2,000 lbs. per. hr. of minus 80-mesh wood flour made from Norway spruce. The raw material consists of wood waste such as edgings, blocks, etc., up to 3 in. thick and moisture contents of not over 40 per cent. The material is first reduced in a wood hog, bringing the stock to a 1-in. ring size or finer and then subsequently reduced in an 18-in. hammermill with 1/8-in. perforated screens. The final reduction is with two Sprout-Waldron 36-in, double-runner attrition mills, each driven by two 100-hp, 1800 rpm direct-connected motors.

The system includes drying equipment as well as inert gas protection. For classifying, a large super-sifter is used. With a capacity requirement of 2,000 lbs. per hr., the total estimated horsepower is 650, with 6-8 men required for each eight-hour shift.

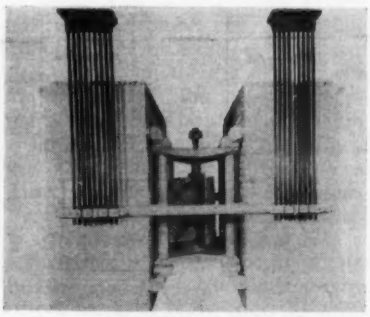
Another system of interest is designed for producing a minus 60-mesh wood flour from black gum chips with an input rate of 4,000 lbs. per hr. The dry chips are fed into an F-11 cutter driven by a 40-hp motor and conveyed by a standard products collecting system to a Style G, 40-mesh wire dusting reel. From here the oversize is spouted to two 36-in. 1400 rpm, double-runner attrition mills. The material is conveyed to additional centrifugal reels clothed with 40-mesh wire. The in-range material is taken to packers and the oversize is sent to a second pair of 36-in. double-head mills, operated with 75-hp motors at 1200 rpm. This material is then conveyed to centrifugal 60 mesh wire reels. The product from these reels is again sent to the packaging division.

It is apparent from these brief outlines that the horsepower requirements for production of wood flour are quite high. The estimated production of 80-mesh wood flour in the Holt Hardwood system is approximately 5 lbs. per hp. hr. The system designed for the use of softwoods is listed at approximately 3 lbs. per hp. hr. Coarser grinds such as 40-60 mesh would increase this figure to approximately 16 lbs. per hp. hr.

S-W Double-head attrition mill



S-W Heavy-duty hammermill



S-W Super sifter

Pregrinding

As indicated in the above systems, hammermills have been used quite extensively for regrinding. The application of these units has usually been limited to shavings, chips or coarse sawdust. No data are available on the use of other units for edgings, trimmings or blocks. It is recommended that a hard or heavier-duty pregrinder be used, prior to further reducing in the hammermill. Capacities for the hammermill are dependent, of course, on the type of wood and the fineness of grind. The capacities range from an extreme of 450 lbs. per net average hp. hr. on a 3/4-in. perforated screen to a minimum of 50 lbs. per net average hp. hr. on a 1/4-in. screen.

The use of a rotary knife cutter for wood flour is extremely limited. The stock must be free of stones, metallic particles, etc. It is also definitely limited as to feedstock size, with coarse sawdust and shavings being the maximum possible size of materials used. Capacities of these rotary knife cutters vary with the type of wood and the screen size selected. For example, a throughput of 80 lbs. per net average hp. hr. can be obtained with 14/64-in. screens. This throughput is substantially reduced to a figure of approximately 12 lbs. per net average hp. hr. when a 1/32-in. screen is used.

Attrition mills

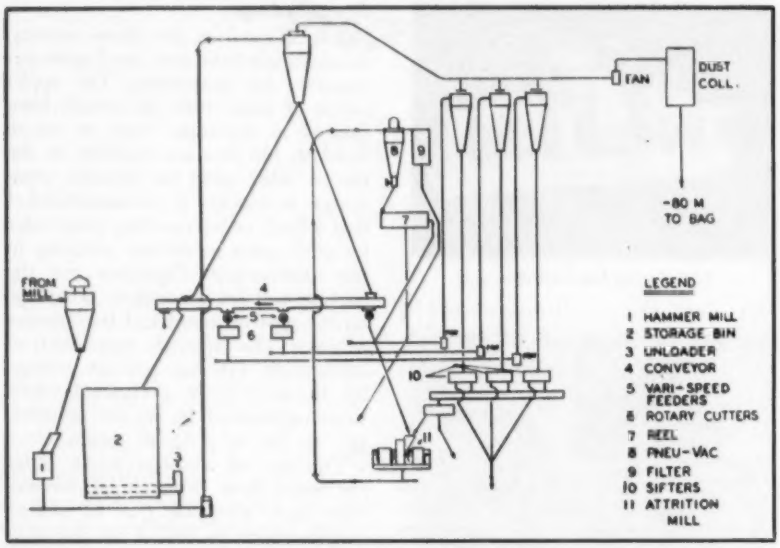
The use of the attrition mill in the wood flour production is the key or heart of the system. The throughput of the double runner mill varies, of course, with the type of wood and the fineness of grind. The production of 80-mesh wood flour from softwood shows an average production of 5 lbs. per hp. hr. With hardwood, this is substantially higher, being approximately 10-15 lbs. per hp. hr.

Uniformity of feed is essential for good operation on the attrition mill. Careful selection of the type of feeder must be made and it is suggested that a variable speed unit be included. The normal single agitator feeder as furnished with most attrition mills is inadequate. A more positive unit such as a rotary vane feeder valve with variable speed motor is often used.

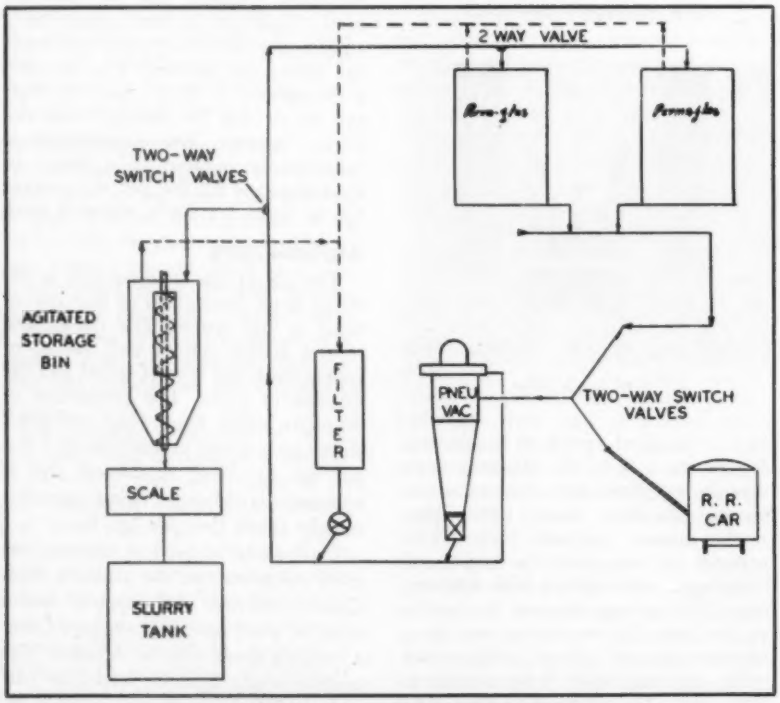
Hammermill vs. attrition mill

Probably one of the most controversial issues in the production of wood flour is the relative merits of the attrition mill versus the hammermill for final grinding. Our preference is for the attrition mill. And this can be offered with complete objectivity since our company manufactures both units.

One of the prime reasons for prefer-



Holt-Hardwood Co. wood flour system.



The RUBEROID Co. wood flour conveying system.

ence of the attrition mill is its lower maintenance and operating cost. With a material of such low margin of profit as wood flour, this can be very significant. In addition, when grinding to the finer mesh flours, the effectiveness of the hammermill is reduced by the low inertia and high air resistance of the very fine wood particles. This often results in a bulk movement of the particles out of the path of the hammers or in a small difference between the velocity of the hammers and the velocity of the air-borne particles within the grinding chamber. In addition, the wood flour produced by attrition mills is soft, similar to the texture of wheat flour, and comparatively uniform in particle size. The hammermill, on the other hand, usually presents a lesser degree of fire hazard due to the high air velocity and the dense concentration of flour within the mill. In addition, the hammermills have a lower first cost than the attrition mill.

Sifting

Since all of the systems as discussed depend on a gradual reduction process, they incorporate a need for sifting. The sifting of wood flour is one of the more difficult jobs in the process. Capacities of equipment are generally quite low, necessitating large screen areas and usually the use of a super-type sifter for any quantity production.

Needless to say the sifting of softwood flour is considerably more difficult than that of a hardwood, due to the higher pitch content and also the more fibrous nature of the stock.

The presence of static electricity in wood flour presents a problem and in part contributes to the low screening rates. This can be partially offset by proper grounding of the screen, pans and sieves. In certain instances, the use of anti-static agents as sprayed on the screens has helped. However, their effectiveness is usually of a temporary nature, necessitating frequent re-applications. Heating the product has helped in certain instances.

The use of auxiliary sieve cleaners is recommended with a preference given to Carmichael "A" cleaners.

Pneumatic conveying

The complexity of flow in these woodflour systems, coupled with the relatively high percentage of recycle load, makes the application of pneumatic conveying very advantageous. A very interesting pneumatic installation is in use at The RUBEROID Co.

This system is used for a number of purposes with a single negative pressure design doing a combination of operations. First of all it unloads wood flour from a railroad car and conveys it either to a storage silo or to an agitated storage bin over the scale unit. This same unit is also used to convey the wood flour from the storage bin unloaders to the agitator storage bin. Both positive and negative pressure air systems can be used for the handling of wood flour. Special precaution should be taken in the specification of the filter. In addition, static electricity is again a problem.

Since inert gas is quite often used with these systems, the pneumatic system with closed-circuit return of exhaust air often proves advantageous. However, caution should also be used in the design of the return line. Due to the high horsepower requirements, along with low capacity there is always the possibility of an objectionable buildup of temperature in the closed system. If the material has any tendency to char or ignite, this temperature buildup will accentuate the problem.

Manufacturing and budgetary controls for a prime paper converter*

PETER J. KING

▶ High cost of raw materials in the paper converting industry results in the tendency, by managers, to ignore labor costs and machine efficiencies.

PAPER CONVERTING can be a simple process, such as purchasing a large roll of paper from a pulp mill and putting it through a single operation. Or, it can be considerably more complex and involve several processes plus a substantial amount of hand work. Also, as the requirements of the product become complex, it is quite likely that more than one manufacturer will have a hand in the converting process.

The term "paper converter" covers a vast number of manufacturers in the paper industry. The term "prime paper converter" (as opposed to the integrated manufacturer) is usually applied to those firms who do most of their converting of a paper pulp mill roll by machine processing with a minimum amount of hand work.

Typical prime paper converter products include tissue papers, papers for printing and wrapping, labels, paper cups, papers that are laminated or reinforced with glass, rayon, asphaltic and non-asphaltic resins and plastics, and a myriad of papers for gumming and coating uses.

The product combinations are infinite, and the markets they serve are almost as varied as the products. The larger converters must maintain several distribution channels, depending on the range and the end use of their products. A single converter might find it necessary to work through dealers, wholesalers, jobbers and other converters, in addition to selling directly to industrial users.

Because of the low permanent investment required in relation to sales volume and readily accessible markets, the prime paper converting industry has many small producers. This creates a continuously competitive price situation. Thus, the larger converter with many lines often finds himself in competition with several small producers in each of the major categories of products. Also, with so many smaller companies involved, cost and manufacturing controls have not progressed to a point where there is adequate cost knowledge. This, too, tends to aggravate the problems of price competition.

For the majority of products, there are few manufacturing operations. Three or four processes will be sufficient for most. The prime equipment is typically quite flexible and runs at a high rate of speed. Speeds of 500 to 1000 fpm are not uncommon. One or two pieces of prime equipment may turn out several millions of sales dollars per year.

Characteristics of costs and industry attitudes

As one might expect, the equipment has a voracious appetite for raw materials. As an element of cost, raw material is by far the highest. Table I lists the proportion of raw material to the total factory cost of four major product lines. The high proportion holds true, even though the lines are quite different, both as to type of primary equipment necessary to produce them and as to the construction of the product.

This peculiar characteristic poses one of the more serious problems of controls in the industry. Converting managers tend to overlook labor and burden controls because they are not a major element of cost. In more than one instance, a converter has met his downfall by not keeping labor costs and machine efficiencies in proper perspective. Because increased costs due to these labor and efficiency factors do not have a startling effect on total product cost, particularly when shown as a per cent of the total, they are frequently overlooked. Table II illustrates the effect of a 5 per cent wage increase for three representative products in different categories.

The effect of the wage increase on the overall cost is small and the effect on the selling price is even smaller. The pressure to prevent increases in labor and overhead costs from day to day is not great. In a highly-competitive market, however, the adverse effect on net profit and return on investment may be significant. This can be illustrated by taking Product A in Table II and making all the computations necessary to arrive at a net profit by product. The results would be as follows:

Net profit before wage increase (% to gross sales)	2.1%
Net profit after wage increase (% to gross sales)	1.8%
Per cent CHANGE	−14%
Return on investment before wage increase	15.1%
Return on investment after wage increase	12.9%
Per cent CHANGE	−14%

Another serious problem that also tends to weaken the market, sometimes confronts the converter. As sales soften, the high-speed equipment builds inventory at an alarming rate. Efforts must be made to liquidate abnormally high inventories to replenish dwindling working capital. Because the prestige of the converter is being measured more and more by the width of the paper he can produce and by the speed of his equipment, this problem is accentuated.

*Received from the publication files of the National Association of Accountants.

Budgetary and variance controls

The principles of standard costs and budgets apply to the paper converting industry as they do to any other. The over-all variance summary reports should be simple, brief and direct: each variance must be meaningful and without ambiguity; and the budgets upon which the variances are based must be realistic. Most enlightened members of management recognize the major classifications of expenses. Therefore, when variances are based on these major classifications and are presented simply, they should act as a directive for firm and swift action.

It was indicated previously that a major problem of the converter is the possibility of fast inventory build-up. One of the first steps in controlling costs is in the establishment of very sound and strictly controlled inventory policies for all stages of manufacture. Once these policies are firmly established, the plant manager finds himself continually under pressure to reduce manpower as the prescribed inventory levels are reached. This will also help maintain the proper balance of inventory investment. Meanwhile, the variance reports will point up excessive slowdowns and operating inefficiencies as the back-log of work diminishes.

The characteristics of the industry and the philosophy of the manager practically dictate the type of controls necessary. The breakdown of cost elements listed in Table III emphasizes the need to wtach all components with equal vigor. The material proportion, by far the largest of total cost, cannot be reduced without product specification changes, but the rest of the conversion costs fluctuate due to many factors and require close control.

The answer is to control each of the components separately and in enough detail to be helpful to all levels of management. Table IV illustrates the profit and loss summary with which top management must work. Subsequent reports break down the figures in detail for the operating managers and foremen. In all cases, however, an extremely important factor in successful control is to keep each type of variance as pure as possible, being sure to isolate those that a manager can control from those that he cannot control. Table IV represents a simple profit statement for Plant X. Only a glance at this statement is necessary to receive an overall picture of the operation.

Although the operating managers actually work from reports having greater detail than the above, it is necessary that their responsibility for each variance be clearly defined at every level of reporting. Long lists of variances which appear on operating statements, but are not clearly charged to a specific responsibility, do not carry much meaning. Likewise, the content of the account must be pure as to its purpose. A case in point is the volume account which should show unabsorbed fixed expenses due to sales volume, but often contains a multitude of other unrelated charges.

Table V indicates the summary of individual variances which are, in turn, summarized on the profit statement. Note particularly the distinction made in the fixed overhead accounts. Losses due solely to volume are carefully separated to show where the plant manager's responsibility ends. The unabsorbed overhead due to machine inefficiency is also shown. Pointing up this type of loss discourages investment in additional equipment when capacity is strained by inefficient production rather than sales volume.

The amount of detail for each major variance is illustrated in the tables designated, VI(a), VI(b), and VI (c).* Expenses which can be distributed and controlled are broken down to either operating machines or departments. Those expenses which cannot be reasonably controlled except at a plant level are not distributed beyond this point.

Direct labor costs having the greatest controllability are maintained with the greatest amount of detail. They are controlled by operating cost centers. Departmental controls are maintained

*Table VI(d), a waste summary, is discussed later.

Table I

Product Line	% Raw Material Cost of Total Factory Cost A	B	C	D
% Raw Material Cost to Total Factory Cost	75%	74%	77%	83%

Table II

Product	Effect of 5% Wage Increase A	B	C
Raw Material	$12.96	$30.41	$ 9.01
Labor & Overhead	3.54	7.36	2.19
Total Cost	$16.50	$37.77	$11.20
5% Labor Cost Increase	.13	.28	.08
Revised Cost	$16.63	$38.05	$11.28
% Labor Cost Increase to Revised Cost	.8%	.7%	.7%

Table III

Estimated Breakdown of Cost Elements*

Cost Component	% Of Total Cost
Material	69%
Material Waste	7%
Direct Labor	7%
Variable and Fixed Overhead	17%
Total	100%

*Four Major converting locations

Table IV

Plant X

Monthly Operating Statement			January, 1959
Gross Sales			$600,000
Net Sales			$563,400
Standard Cost of Sales		$444,000	
Variances:			
Plant Controllable	$10,500		
Purchase Price	$2,650		
Volume Loss (or Gain)	$11,000		
Total Variances		$ 24,150	
Actual Cost of Sales			$468,150
Actual Gross Profit			$ 95,250

Table V

Plant X - - Plant Variance Summary

PERIOD: JANUARY, 1959

	STANDARD	ACTUAL	RATIO	YEAR TO DATE
Direct Labor				
Variable O. H.				
Fixed O. H. Efficiency				
Fixed O. H. - Budget				
Raw Material Usage				
Waste				
Inventory Adjustment				
Cost of Odd Lots and Secs.				
Sale of Waste and Secs.				
Total Plant Controllable				
Purchase Price Variance				
Volume Loss (or Gain)				
Total Plant Variance				

Table VI (a)

Plant X (Controlled by cost center)
Direct Labor Summary Period: JANUARY 1959

Operation	Rate and Crew Var.	Efficiency Variance	Width Variance	Total D. L. Variance	
1.					
2.					
3.					
Total Dept. A					
Total Plant X					

Table VI (b)

Plant X - Department A (Distributed by department)
Variable Overhead Summary Period: January, 1959

Black: favorable Red: unfavorable	Unit Cost per hour/pound as Budgeted	Flexed Budget for Period	Actual Expenses for Period	Variance
Indirect Labor				
Overtime				
Supper Pay				
Downtime for Set-up				
Downtime for Repairs				
Make up Pay				
Learning Pay				
Errors				
Labor Expense				
Miscellaneous				
Supplies and Expenses				
Water or Steam				
Maintenance Labor				
Maintenance Burden				
Maintenance Materials				
Redistributed Charges				
Sub Total				
L. or G. Due to Dept. Eff.				
Total for Dept.				
Budget Hours/Pounds				
Standard Hours/Pounds				
Actual Hours/Pounds				

Table VI (c) (Distributed by Plant only)
Plant X
Fixed Overhead Summary - Period: January, 1959

Black: favorable Red: unfavorable	Unit Cost per Hour/Pound as Budgeted	Flexed Budget for Period	Actual Expenses for Period	Variance
Jr. Exec. & Foremen				
Factory Clerical				
Premiums				
Fringe Benefits				
Travel, Subscrip., Dues				
Factory Office Expense				
Bldg., Supp. & Maint.				
Ground Maint.				
Gen'l. Mill Supp.				
Quality Control Exp.				
Miscellaneous				
Depreciation				
Patents				
Insurance				
Taxes				
Rent				
Total Plant Fixed				

This article will be concluded in the May issue

on a departmental basis only. Fixed expenses are controlled on a plant-wide basis.

Waste control is extremely important, and every possible method must be used to keep it controlled. But no matter how much detail is kept on waste, approach to waste control should be simple lest the details obscure the picture. Input and output pounds, if kept by production order or lot number as well as by process, will go a long way toward isolating the factors which cause excessive losses. If this can be done, it is possible to control waste by product as well as by process.

As a waste control tool, the computation of an irreducible waste factor for major product groups is invaluable. This factor includes minimum process trim waste, wrapper and core losses, threading waste, etc. It excludes, however, waste lost while the equipment is actually running. This tool shows the lowest possible waste and also the lowest possible material cost that can be had for a product unless there is a machine or specification change. Table VI (d) shows an over-all waste report with these factors included. The irreducible factor is inserted in the report on a memo basis and not booked for accounting purposes.

From Table VI (d), we can determine the amount of actual waste compared to standard and also see when a major line could stand some scrutiny. A look at the Heat Resistance Paper line will reveal the necessity for a change in product specifications or a machine modification to bring the standard waste closer to the theoretical minimum waste value.

Table VI (d)
Plant X
Monthly Waste Summary Period: January, 1959

Product Line	Irreducible Minimum Waste	Standard Waste Per Cent	Actual Waste Per Cent	Per Cent Difference	Waste Variance
Bonding Paper	6.0%	8.0%	9.0%	1. %	$100.
Heat Resistance Paper	9.0%	14.0%	15.4%	1.4%	140.
Coating Papers	7.4%	8.0%	8.2%	.2%	20.
Boardstock	11.0%	12.3%	11.1%	(1.2%)	(120.)
Total Plant		10.6%	10.9%	.3%	$140.

Vegetable-base adhesives

(Continued from page 14)

initial stages of the reaction. Enzyme converted starches are very extensively used as the binder in clay or pigment coatings at the high solids concentration required in "on-the-machine" paper coating processes. They are also used in making prepared liquid adhesives.

Solutions of enzyme converted starches, in the early stages of hydrolysis, tend to set up to pasty masses. This paste can be destroyed by agitation. If the agitation is extensive, the composition will retain its fluidity on storage. This rather odd behavior is not readily explained. Where pasty products are desired, as in prepared "library" pastes, the enzyme modified starches are frequently mixed with white dextrins.

Oxidized starches

The oxidation of starch is normally carried out with hypochlorite, hypochlorous acid or hydrogen peroxide. The oxidation with hypochlorous acid may be accomplished by suspending the starch in water and treating the entire suspension with cholrine. Oxidative degradation results to provide a starch with a lower viscosity. Water solutions have much less tendency to form gelled or plastic masses. Hydrogen peroxide oxidation is normally carried out in the presence of sodium hydroxide at temperatures below the gelation temperature of the starch.

The net result of these oxidations is to provide starches which have only very slight tendencies to become plastic in solution. The degree of oxidation must be controlled since over-oxidation produces plastic products for reasons which are not too clear.

Oxidized starches are used extensively as binders in the manufacture of pigment-coated paper or board. For low or medium solids coating colors, oxidized starches are used alone as the only adhesive, providing superior binding strength to produce a coated paper of good color, smooth surface, and excellent printability. For coating colors of higher total solids, they are blended with high-strength dextrins.

Adhesive percentages for coating colors are generally in the range of 16 per cent to 20 per cent, the higher adhesive proportions being used where a particularly strong coating is required.

Alkali gels

The alkali treatment of starch is carried out in order to enhance the gelation properties of the starch. Normally, starch suspended in water will gelatinize when a certain threshold temperature is reached. This temperature is greatly reduced by the presence of alkali. Also, the gal which results from alkali treatment is more viscous. The manufacture of such starches may be carried out simply by adding alkali at room temperature to a water dispersion of starch. The mixture is agitated to produce a gelatinous mass. As the agitation continues, viscosity increases until one obtains a compromise between a true gel and a viscous consistency. As such, they have a ropy consistency which can be altered by adding acid to neutralize the alkali. When this is done, soft, pasty products result. Starches which are usually modified by alkali include tapioca and sago and sometimes potato starch.

Oxidizing agents may be included during the treatment with alkali in order to hydrolyze the starch. The resulting products may be formulated into viscous liquid adhesives. Alkali modified starch is the basis for an adhesive for labels for bottles where resistance to cold water or cold condensate from the air is desirable.

Salt gels

Salts may also be used in order to decrease the gelatinization temperature of starch. These include zinc chloride, magnesium chloride, calcium chloride and calcium nitrate. Tapioca starch is commonly used for salt treatment. Here the enzyme converted products and white dextrins may be included in order to increase the solids concentration initially without achieving a mass too viscous to agitate. Such adhesives are used as mounting adhesives where warping would be highly undesirable.

The final category of starch products — water soluble starch derivatives — have not achieved commercial volumes in the United States. It is possible to convert starch into the same types of derivatives as cellulose. For the most part, however, the economics are not desirable since cellulose is cheaper than starch. Furthermore, the properties obtained from the starch derivatives have not, for the most part, justified the higher costs. Among the derivatives which have been provided on a development basis are the starch acetates and the hydroxyethyl starch ethers.

Other recent starch modifications

A recently developed cationic starch derivative has a strong cationic charge which results in virtually 100 per cent retention on the anionic cellulose fibers. This and its strong adhesive properties have contributed greatly to the significant increases in strength of the final paper and board.

The cationic starch derivative is also claimed to be extremely effective as a retention aid for anionic pigments and fillers, such as titanium dioxide with which it forms electrochemical bonds. This derivative is used to upgrade various papers such as lightweight coated papers, kraft bag and liner stock, offset papers and writing papers.

Another line of recently reported starch derivatives are the hydroxyethyl and the acetylated starches which are used for surface sizing and coating applications. These derivatives form films of superior toughness and flexibility and improve the surface properties of paper and board. They also exert exceptionally strong binding of fillers and pigments. The acetate product is grease and oil resistant and imparts to paper and board superior surface characteristics.

On- or off-machine coating

(Continued from page 15)

Two situations are readily apparent: (1) where a machine is operating at the limit of its drive, a portion of the dryer may be removed to permit more ready installation of the coater, or a portion of the drying capacity may be applied to accomplish drying of the coating, as in the case of calender dryers—with the net result of generally lower installation costs; (2) where drying has previously been the limitation, operating speed may be increased to realize lower operating costs per ton.

Quality requirements

In many mills, quality requirements will be the key to the type of coater installation.

Should it be desired to apply lightweight coatings to accomplish a filming effect, a relatively simple coater may be inserted in the machine at minimum cost. Drying problems here are not acute.

Where emphasis is on high-coated quality, heavy-coating weights are generally the rule. In certain cases, the installation of on-machine equipment to apply and dry coatings of 15 to 20 lb. per ream is not feasible.

An approach to high quality, and possibly the best approach from a technical standpoint, is that of double coating. This can and has been done on the machine, though the problems of layout on the machine are somewhat involved. If an off-machine unit

(Continued on page 39)

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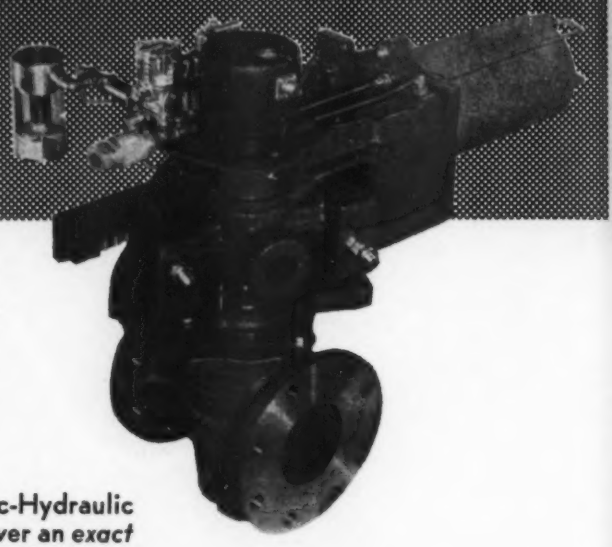

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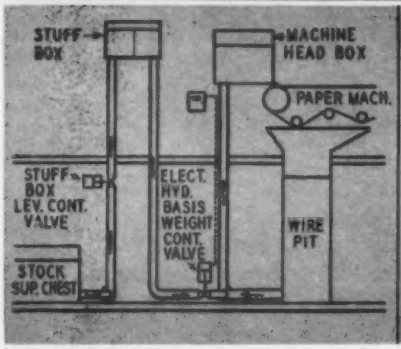
APPLICATION



The Electric-Hydraulic Actuator, mounted on a DeZurik Vee Port Throttling Valve, will provide far greater accuracy and repeatability than can be obtained with a stuff gate mounted on the stuff box.

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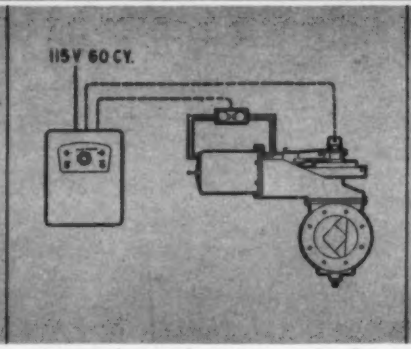
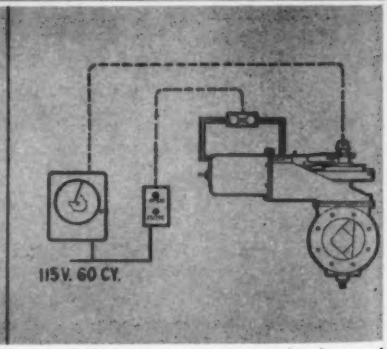


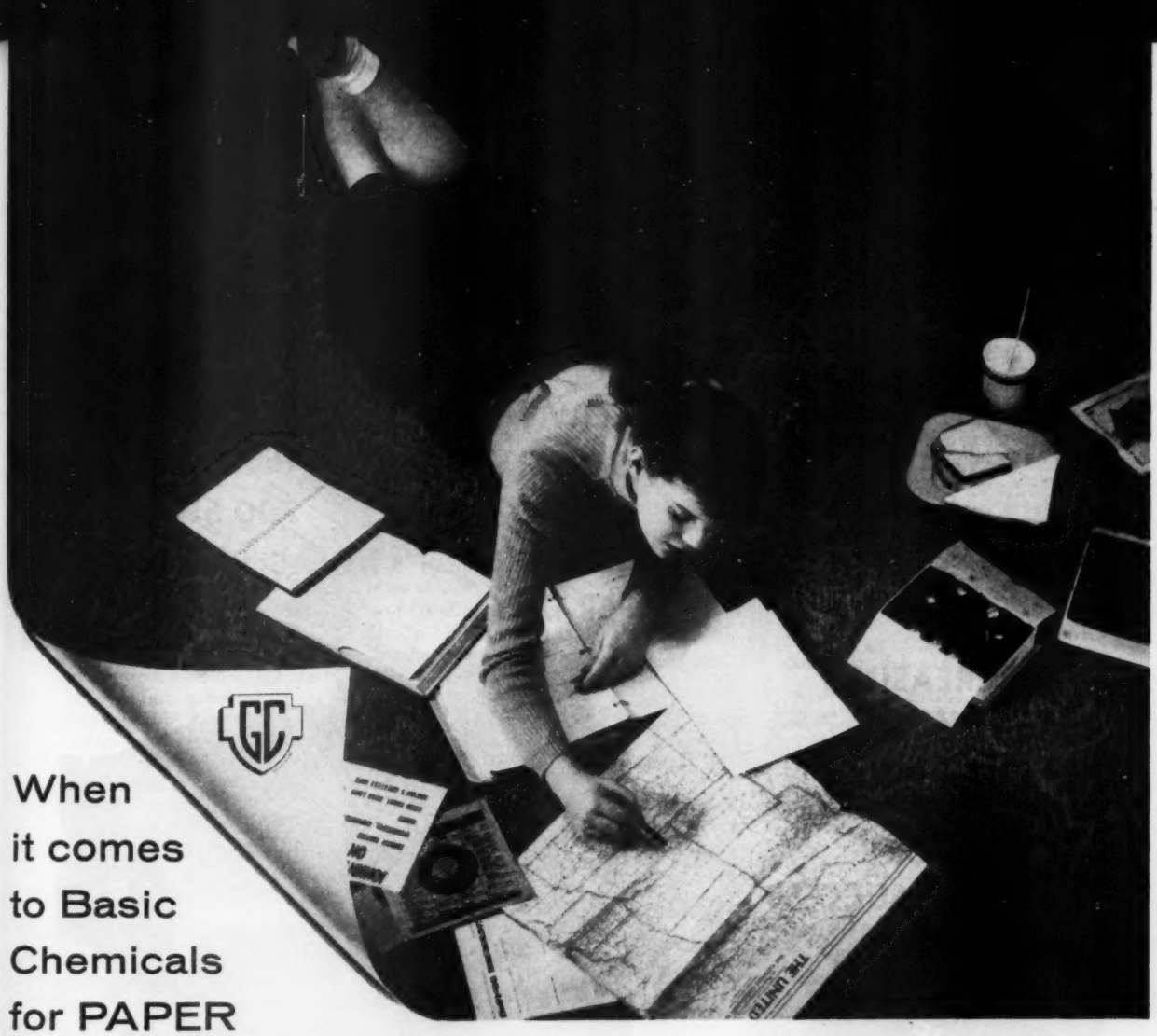
A manual control station can be furnished to provide very accurate control of the valve at an economical price. It is equipped with a vernier ten-turn counter-dial with 1000 divisions.

Since it can be set to ½ a division, this allows 2000 repeatable valve positions.



A push button station can also be used in conjunction with an electronic recording instrument. Because valve position is a function of basis weight, changes in basis weight are therefore recorded on the chart.

The output from a Beta Gage can also be used to control the valve through suitable instruments.



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CURRENT COMMENTS

Research increasing rapidly . . .
APPA opposes new labor bill

By WARREN B. BULLOCK

Russian efforts to establish a market for its wood pulp in the United States are little more than an attempt to disturb the economy of the free world. This becomes evident from a study of the Soviet's program for development of its pulp and paper industry. Russian production of 2,000,000 tons of pulp in 1958 was far from sufficient to meet its home market for paper. Under a program with Sweden, Russia is to buy pulp and paper machinery for its home program of increasing its production one and a half times within five years. A small shipment of pulp to the United States from Russia in 1958 was about $25 per ton below the prevailing price here. Russia in the past has endeavored to injure the economies of nations in the free world by dumping its products, but the proposal to ship pulp to this market is not likely to disturb conditions in this country. Reports of contemplated shipments of 200,000 tons in 1959 are hardly credible in view of the known conditions of Russian producing facilities.

While the "top brass" of the paper industry during the recent convention devoted considerable attention to theoretical discussions of the need for additional research, evidence has been forthcoming that practical research programs are already extensive and increasing rapidly. An official estimate is that the industry today is expending $40,000,000 a year in research. On the other hand, one industry authority thinks that the present expenditure of 1 per cent of sales on research compares unfavorably with the 4 per cent expended by the chemical industry.

A typical practical development in the research field is the recent decision of Oxford to expand its technological activities. Not only has Oxford opened a market research program, but it has named Harold M. Annis as vice president for research and development and Dr. William Hoge has been promoted to director of technical specialties development. Group leaders will include Harold Buck (a University of Maine graduate) and Dr. Victor Mattison (formerly of the Institute of Paper Chemistry) as assistants to Dr. Hoge.

Western Michigan University has secured Dr. Andreas von Koeppen as a research professor through an agreement with American Box Board Company which pays the salary and incidental expenses of a new department. Crown-Zellerbach has announced a 40 per cent expansion in its development laboratory at Camas, Wash., which already has a complete small scale pulp mill and a 24-inch paper machine.

Expanded research programs have been authorized by the National Council for Stream Improvement to eliminate industrial waste and prevent air and water pollution.

The manner in which research in the use of hard woods is advancing is again shown in the announcement that Finch, Pruyn & Co. Inc. of Glens Falls, N.Y., pioneer producer of newsprint, is introducing a new white bond made principally from northern hardwood sulfite pulp. Research has made possible the company's new $5,000,000 neutral sulfite pulp plant.

APPA opposes new labor legislation

The American Paper & Pulp Association has filed a statement with the United States Senate committee studying labor legislation, sharply opposing the pending measure sponsored by Senator Kennedy. The industry statement expresses the belief that there should be strong anti-racketeering labor legislation but that the present bill contains little that would actually correct corrupt practices already exposed. Conversely, the statement points out, the bill is in fact an anti-employer measure, handicapping the employer group with more restrictive legislation than it experiences under present legislation. The American Paper & Pulp Association urged all of its members to express their opinion on the legislation to their Senators and Representatives in Congress.

Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	March 10, 1959	February 10, 1959
American Can	48⅜	49⅛
Same Pref.	39⅞	39¾
Celotex	41⅜	39⅛
Same Pref.	19½	* 19⅛-19½
Certain-Teed Products	15	14⅜
Champion P & F	46⅛	46
Same Pref.	* 96¼-97¾	* 96⅛-97½
Chesapeake	36⅜	35⅛
Container	28⅛	27⅜
Same Pref.	* 90-92	* 89-91½
Continental Can	52	52¾
Same Pref.	85¼	* 83½-85
Crown Zellerbach	58	53¾
Same Pref.	97¾	96
Diamond-Gardner	35⅛	34⅛
Same Pref.	——	* 30¼-31¾
Federal Paperboard	53⅛	* 53-53½
Same Pref.	* 23-23⅛	* 23-23¾
Fibre Paperboard	53¾	48⅝
Same Pref.	——	*162-168
Great Northern	49¼	49
Hammermill	32⅝	30⅛
International	122¾	119½
Same Pref.	* 90-93	92
Kimberly-Clark	62½	62
McAndrews & Forbes	32¼	32¼
Masonite	43¼	37⅝
Mead	48	47½
Same Pref.	* 94½-95	* 92½-94
Minnesota & Ontario	36⅜	36⅛
Oxford	34¾	33
Same Pref.	93½	* 98-99
Rayonier	24¾	20⅛
Riegel	36⅜	34¾
St. Regis	46½	44¼
Same Pref.	96½	95½
Scott	82¼	78¼
Same $4 Pref.	92½	* 91-93
Same $3.40 Pref.	75	* 73-78½
Sealright	46¼	41½
Standard Packaging	32¾	29¾
Same $1.60 Pref.	97½	* 86-89
Same $1.20 Pref.	34¾	34
Sutherland	42⅜	43
Union Bag-Camp	49⅜	42¾
United B. & C.	32½	30⅞
United Wallpaper	9⅞	9½
Same Pref.	* 19½-19⅞	* 17½-18
U. S. Gypsum	104½	103½
Same Pref.	161½	*159-161
West Virginia	45⅛	43⅜
Same Pref.	* 97⅛-98	97½

New York Stock Exchange — Bonds

Champion P. & F. 3¾%	—	—
Champion P. & F. 3%	—	94
Champion P. & F. 4½%	124	116
Diamond Gardner 4%	97	97
Kimberly-Clark 3%	93	—
Mead 3%	—	—
Oxford 4¾%	116	113½
Scott 3%	114½	110¾

American Stock Exchange — Stocks

Allied Paper	12¾	9½
American Writing	34	32¼
Brown	14	13¾
Puget Sound	23	21½

*Closing Bid and Asked Prices

DRAMATIC MOMENTS IN PAPER-MAKING PROGRESS

Aubrey Crabtree, President of Fraser Paper, Ltd., and Mill Manager J.W.D. Hierlihy are shown here "center stage" in one of the paper industry's most exciting events—the first run of a newly rebuilt machine. In their hands is paper produced by their Fourdrinier machine, which was completely rebuilt by Pusey and Jones and is now in service at Fraser's Madawaska, Maine, mill.

It has a completely new Fourdrinier, a 228" wire width, 100' 0" wire length, 2000 fpm speed, and was preassembled at the Pusey and Jones plant for faster installation and on-time start-up. A vacuum pickup arrangement and an after-dryer section with completely enclosed gearing were added.

Pusey and Jones, the first company in the United States to specialize in the manufacture of paper-making machinery, continues to pioneer with such developments as the Automatic Air Guide System® and a new Differential Hydraulic Drive. May we help you with a complete machine or a component specially designed for your needs?

THE PUSEY AND JONES CORPORATION

WILMINGTON 99, DELAWARE

EXPORT AGENTS: THE PUSEY AND JONES INTERNATIONAL CORP., 90 BROAD ST., NEW YORK 4, N. Y., U. S. A.

Fourdrinier Machines • Cylinder Machines • Yankee Machines • Slitters, Winders, Unwinders, Brakes • Mechanical Drives • Rolls • Dryers • Calender Stacks and Reels • Differential Drives • Automatic Air Guide System

NEWS of the INDUSTRY

10 Million Trees to Be Planted in Illinois

Over 10 million pine and hardwood tree seedlings produced by the Illinois Division of Forestry are being planted in 10,000 idle acres in Illinois.

While natural reseeding accounts for much of reforestation in Illinois, the planting will have eventual impact on the forest economy along with added recreation, wildlife, watershed and soil conservation values.

Deer Damage Must Be Cut

Managers of public and private forests in Wisconsin have made a strong plea for unit deer management to reduce herds where they are harming forests.

Deer damage is estimated at 39 per cent of the forest lands in 31 northern and central counties.

Unit deer management would involve making hunting seasons and regulations fit the needs of various areas.

Owens-Illinois Announces New Plant

Owens-Illinois Glass Co., Toledo, Ohio, has announced construction details on a new plant being erected in Minneapolis for the production of corrugated boxes.

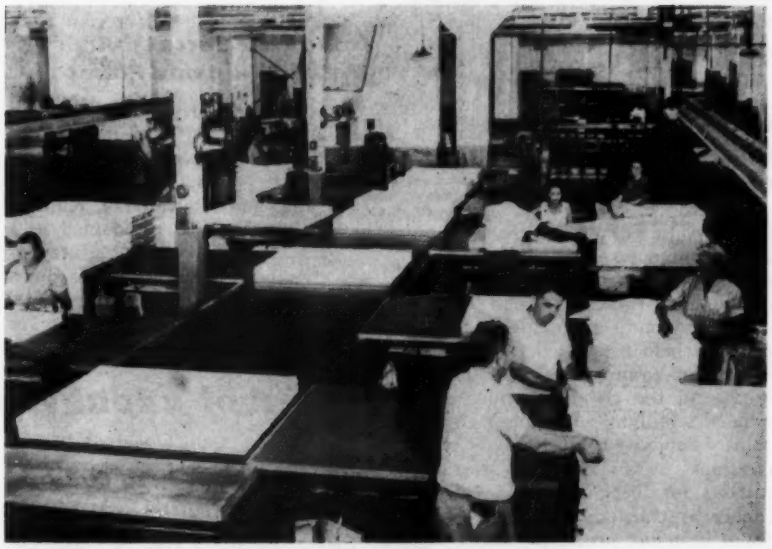
The box plant will be located in Valley Industrial Park, a 2,275-acre tract set aside by the Minneapolis Area Development Corp. for an industrial community.

Byron Weston Uses AccuRay

The AccuRay gauge is now being used to guard the quality and uniformity of bond, ledger and index bristol papers made by Byron Weston Co. of Dalton, Mass.

AccuRay, a beta radiation gauge made by the Industrial Nucleonics Corp., employs radioisotopes to keep a continuous check on the uniformity of cotton fiber papers during the manufacturing process. As the web of papers moves along on the paper machine, the source unit and sensing head move back and forth across the width of the machine continuously scanning the sheet and measuring its mass without touching the paper.

Instead of manually weighing an occasional small sample, the operator now has a continuous profile of the entire run of paper from a console at the machine tender's station where a continuous picture is shown on a strip chart.



A FINISHING ROOM improvement program has recently been completed at the Aetna Div. of Howard Paper Mills Inc., Dayton, Ohio. The program was designed to upgrade two critical phases of finishing room operations—materials handling during processing and cutting and trimming methods and techniques. As a result of this modernization, all three finishing room lines have been automated since July 1956. Pictured here is line two. This combines eight fan and count stations, a powered slat conveyor, a Harris-Seybold Co. precision trimmer, plus a double-deck gravity conveyor and carton wheel.

Scott and Bowater Inaugurate a New Enterprise

Scott Paper Co. of Chester, Pa. and Bowater Paper Corp. Ltd. of London, have announced a new joint enterprise in Australia in which the Bowater and Scott interests will own equal shares.

The company, to be jointly owned and which will adopt the name Bowater-Scott Australia PTY Ltd., presently conducts a converting operation near Melbourne, Victoria, and will proceed immediately with the erection of a tissue paper making plant at that location. It is said to involve an expenditure of some $4,200,000.

This mill and adjoining conversion plant will be the first integrated operation of its kind in Australia.

Aerial Firefighting Cuts Size of Forest Fires

The United States Department of Agriculture has reported that because of increased use of aircraft in forest firefighting, the acreage burned on national forests has dropped almost 15 per cent in 1958, despite a 53 per cent increase in the number of fires.

The use of aircraft has increased tremendously during the past five years. Aerial dropping of fire retardents was not used except experimentally until 1956. In 1958, over 1 million gallons were dropped.

Pulpwood Shipping Rates Lowered for Wisconsin

Approximately $500,000 will be saved annually by the Wisconsin paper industry through a 15 per cent reduction in pulpwood shipping rates by rails from Minnesota to Wisconsin mills.

This reduction, which was effective March 1, will also benefit the railroad industry by stimulating its freight business volume.

USDA Studys Small Forest Improvement Program

USDA's Forest Service, is receiving a Richard E. McArdle, Chief of fine response from his request for an action program to accelerate timber growth on the nation's privately-owned small forests.

The program began with conducted meetings held throughout the country in an effort to find ways and means of improving the growing condition of some 4.5 million small forest ownerships. Subjects discussed at these meetings were: the tax situation, markets for forest products, standing timber as collateral for bank loans, forest insurance needs, the strong and weak points of the going forestry program, forest cooperatives, needs for forest research, and forestry information, education and demonstration.

All proposals and recommendations resulting from these meetings will be given careful study and consideration by the Forest Service task force.

McArdle stated: "Concerted and sustained nation-wide action to increase productivity on the small forest ownerships is needed if these small properties are to meet their full potential. It can help insure our rapidly growing nation of an adequate supply of timber and enhance the economic position of the timberland owner as well".

Scott Produces First Non-paper Product

A urethane foam called "Scott-Foam" is being manufactured by Scott Paper Co. as its first non-paper product. ScottFoam is different from other types of urethane foams because of its completely open-pore structure.

Scott has developed this new product for the filtration field for such devices as air compressors, pneumatic equipment, air moving equipment, air cleaning in internal combustion engines, and in liquid and gas detraining devices.

Mersey Paper Changes Name

Mersey Paper Co. Ltd. of Liverpool, N. S., has changed its name to Bowaters Mersey Paper Co. Ltd.

Mersey Paper has been a Bowaters subsidiary since 1956.

Dead Pine Successfully Used in Pulp and Paper

Forest operations in New Zealand are said to be using dead radiata pine logs for making pulp, paper and cardboard with success. Three major pulp and paper mills at Kawerau, Kinleith and Whakatane have adopted this technique and have reported to increase pulp yield per acre by as much as 20 per cent. Foresters have found that a pine tree remains suitable for pulping for about 18 months after its death.

Because there has been no organized thinning, dead trees are normally very prevalent in New Zealand's pine stands.

A New Corporation

Patio Paper Products Co. is the name given to a new corporation that was recently formed by Sidney G. Graham and Bernard C. Middleton.

The company, headquartered in Chicago, will manufacture and market the Patio line of bulk paper drinking cups plus retail packs of packaged cups and packaged plates.

Mr. Middleton will have charge of the general sales policy, product marketing and sales promotion from sales offices in Kalamazoo. Patio's general offices will be at 2230 S. Union, Chicago. The company is already planning for the addition of other paperboard specialties in the near future.

Recent Expansions in the Industry

Tennessee River to Build $50 Million Plant

Tennessee River Pulp & Paper Co. of Corinth, Miss., will build a $50 million kraft paper liner plant on a 1600-acre site at Counce, Tenn.

Construction will begin this summer and will be completed by January 1, 1961. The plant will have a capacity of 500 tons daily.

New Laboratory

The paper products division of Owens-Illinois Glass Co., Toledo, Ohio, has established a new research, product development and standards laboratory for corrugated and solid fiber boxes.

Technical director of the new facility will be John G. Turk. Dr. Turk has been director of the packaging research laboratory of the Glass Container Manufacturers Institute for the past 10 years.

The new laboratory will combine all of the factors that must be included in any approach to packaging—including field experience, packaging development work and mill research.

Powell River Will Go Ahead on Expansion

The engineering and construction phase are well under way in design for two projects planned by Powell River Co. of Vancouver, B.C.

Consideration of this program began in 1958 when the company decided to extend its activities into the manufacture of wood composition boards and fine papers.

The plant manufacturing wood composition boards will be located adjacent to the company's sawmill division, BCM plant, and will have a capacity of 100,000 sq. ft. per day, using wood residues from the company's operation. It is hoped that this plant will be in operation in late 1959, and will employ 50 men.

The fine paper plant will be built on Annacis Island to the west of Western Copper Mills. This plant will have a capacity of about 14,000 tons a year. It is anticipated that the whole range of fine papers will be made with the exception of coated papers.

No Expansion in Newfoundland for CZ

Crown Zellerbach Corp. has announced that there will be no expansion in the Province of Newfoundland in the near future.

After intensive on-the-spot surveys in Newfoundland, the company stated: "We have concluded that operations which we would undertake carry costs which, with today's selling price for newsprint, make it impossible for us to invest the capital required for a new newsprint mill. It is also clear that economic factors rule out the investment required for a kraft mill based upon Labrador wood.

"It may develop that cost-price relationships will change so that conditions for new newsprint or kraft

investments will be more favorable. Based upon today's economy, however, we have no real choice but to state that we cannot go forward."

Scott Constructs Distribution Center

Construction of a new distribution center in Chester, Pa., began on March 3 by Scott Paper Co.

This center is a part of the company's overall $7,000,000 warehouse expansion program designed to combat expenditures arising from the distribution of products.

Twenty-two railroad cars for loading purposes will be housed in this center. In addition, railroad sidings will provide for the handling of 12 more boxcars outside the building. Twenty truck loading docks will also be available when construction is completed.

$50 Million Mill Project to Start Soon

Celgar Ltd of Vancouver, B.C., will begin its $50 million pulp and sawmill project. Original plans were to build a 300-ton-per-day pulp mill, but present plans call for a 500-ton mill. The site for this project is Castlegar.

Celgar is a wholly-owned subsidiary of Canadian Chemical & Cellulose Co.

Construction of the new mill is in the early stages and is to be completed by spring of 1961. This year, $8 million will be spent for construction of major plant units and $10 million for material and equipment.

Ground Breaking for New Plant

May 1 is the date set to break ground for a new and larger plant of Dubuque Container Co., division of St. Regis Paper Co., Dubuque, Iowa.

The plant, to make corrugated containers, will be the first of two new units planned to house Dubuque's corrugated containers, folding and set-up box manufacturing operations.

Completion is stated to be in late November 1959 and will represent an investment of more than $1,000,000.

Gilman Again Produces Kraft Bags and Sacks

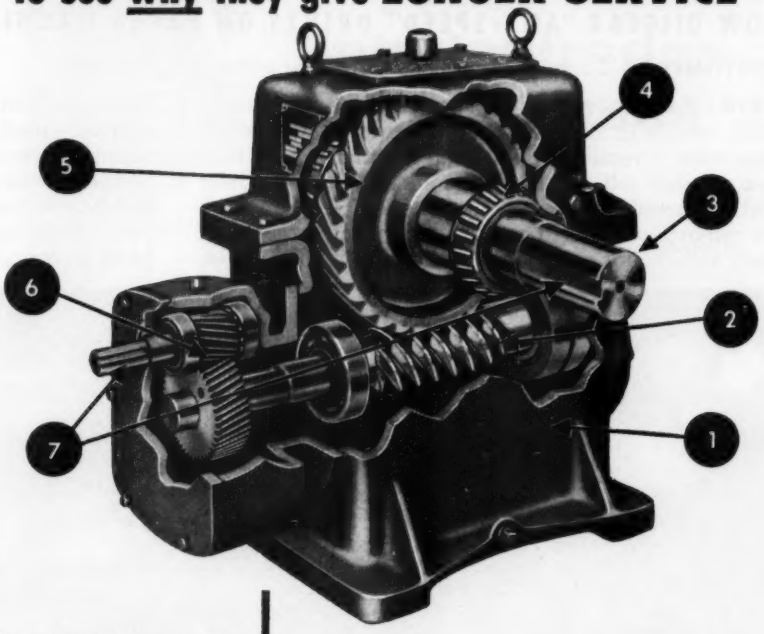
Gilman Paper Co. of Gilman, Vermont, and St. Marys, Ga., have announced the return of kraft grocery bags and sacks to its converted paper lines. These items were staple items with Gilman more than a score of years ago.

The line will be manufactured by Kraft Bag Corp. (a Gilman sub-

Look Inside a Foote Bros.

ENCLOSED WORM GEAR DRIVE

to see why they give LONGER SERVICE



1 EXTRA STRONG CAST HOUSING
Provides rigid mounting and alignment of caps and bearings. Made of high quality cast iron.

2 PRECISION ALLOY STEEL WORM
Integral with oversize shaft. Carefully matched to worm gear for quiet, trouble-free service.

3 OVERSIZE OUTPUT SHAFT

4 HEAVY DUTY, EXTRA LARGE BEARINGS
Oversize bearings used throughout unit. Worm bearings are combination single row radial and angular contact ball bearings. Input shaft bearings are single row radial type.

5 WORM GEAR
Precision generated from uniform density, high hardness virgin bronze alloy casting. High load carrying capacity.

6 HEAT TREATED HELICAL GEARS
Shaved for full tooth contact. Pinion integral with input shaft. Gear locked in position on worm shaft extension.

7 Just one of 10 different types, in a wide range of sizes, ratios and shaft arrangements.

One look at the oversize bearings, larger shafts, precision made gearing and the sturdy housing of a Foote Bros. Hygrade Worm Gear Drive tells you that *this* is a workhorse unit that will stand up and deliver under the toughest conditions.

Notice the carefully balanced design . . . greater mass where it's needed . . . the elimination of weight when it contributes nothing to efficiency . . . strength and toughness at the right places . . . the correct gear alloys . . . the compact design, and above all, the simplicity and ruggedness of this unit.

When you know the *inside* story of Foote Bros. Hygrade Worm Gear Drives, you can understand why they have built a reputation for quality, dependability, and performance that is unmatched by others.

Write for Engineering Manual HGB. It contains complete information on Hygrade Enclosed Worm Gear Drives.

100 YEARS SERVING INDUSTRY 1859-1959 FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION

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. . . Fluid Power news

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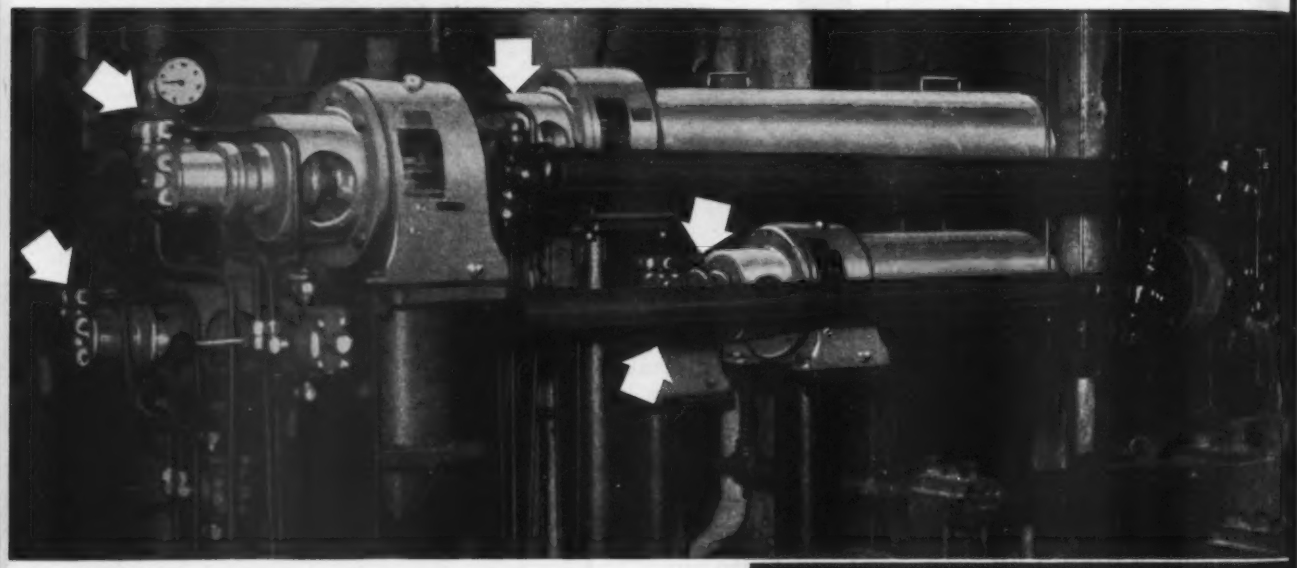
SOLVE

From Oilgear Application-Engineering Files

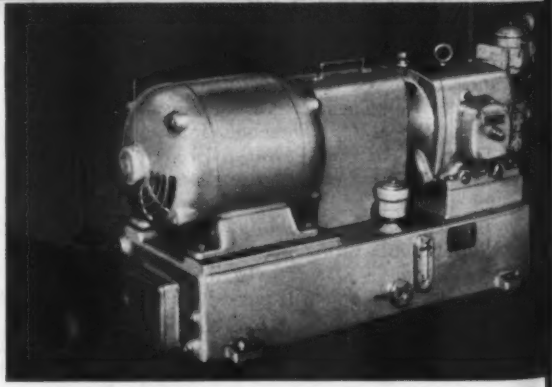
HOW OILGEAR "ANY-SPEED" DRIVES ON PAPER MACHINE SOLVED MOTOR TROUBLES

CUSTOMER: *A Large Paper Company (Name withheld by request)*

DATA: For modernizing a paper machine installed in 1913, rebuilt in 1927. Five drives required for distributor rolls (1 rectifier roll, 2 head rectifier rolls, 2 slice box rectifier rolls) in head box on wet, or fourdrinier end, to spread wet paper pulp "blanket" on wire mesh for removal of water. Due to standard mill practice of daily equipment washdown with high pressure hoses, plus high humidity during operation, use of 5 electric, variable-speed drives would have resulted in excessive maintenance costs. Rotational reversal was desirable on the two slice box rectifier rolls. Must have smooth, steady, continuous slow-speed operation at full rated load. Roll synchronization within 10% allowable. Must be compact, easy to install, and maintain.



SOLUTION: Five "Oilgeareducers"—heavy-duty, constant torque, type "H" hydraulic motors integral with Falk Steel Reducers. As accurate roll synchronization was *not* required, motors were driven in parallel from a single Oilgear "DP" variable displacement pump. This pump has an automatic power-conserving control that reduces power input as load requirements diminish. Independent speed controls were installed for each drive. Two 4-way valves provide for instant, cushioned reversal required for two rolls. A completely sealed, compact, "Any-Speed" Fluid Power drive system . . . impervious to washdowns, automatically protected against overload, with full rated torque at any speed . . . to match any requirement. System is pressure and flood-lubricated automatically with the oil in the system. Over a year of continuous service—no maintenance required to date. Performance has proved superior to requested specifications and has made possible some improvements in paper structure.



Oilgear "DP" variable displacement pump with automatic power-conserving control, 10-hp electric motor, and reservoir shown mounted in basement below the paper machine away from danger of contamination.

This large producer of glassine and greaseproof papers, has also Oilgear-equipped the winder drive in their converting plant glue machine; the center winder drive on a super-calender stack; the unwind and rewind drives on another super-calender; plus many other mill applications.

For practical solutions to your linear or rotary drive problems, call the factory-trained, Oilgear application-engineer in your vicinity. Or write, stating your specific requirements directly to . . .

THE OILGEAR COMPANY

Application-Engineered Fluid Power Systems

1595 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN

sidiary), from kraft produced by St. Marys Kraft Corp. (also a Gilman subsidiary). The new bag plant in Savannah, Ga., will produce a standard and super-standard grades of automatic sacks under the tradename "NO-TARE".

Flintkote Leases Building to Increase Production

A 53,000 sq.-ft. building in Marion, Ind., has been leased by Flintkote Co. for a sheet plant to produce corrugated containers. The plant will be operated by Flintkote's Hankins Container Division, and present plans were made to be in production by April 1.

The plant will produce corrugated containers used by the electrical, glass, food, drug, beverages and paint industries.

No. 2 Machine Now in Operation at Mando

The start-up was several days ahead of schedule for the new No. 2 machine installed at Minnesota & Ontario Paper Co. of International Falls, Minn.

The modern Beloit unit—305 ft. long and weighing approximately 2,000,000 lbs—was erected on the site of a machine which had been in operation for 48 years. Designed for high speed production of high grade specialty papers, the machine will further diversify the scope of paper manufacturing at the Falls mills. The machine produces a web of paper 148 in. wide at speeds up to 1500 fpm.

Extrudo-Film Constructs Second Plant

Extrudo-Film Corp. of Long Island, N. Y., has begun construction of a second plant in Pottsville, Penn., that will quadruple its present capacity to produce extruded polyethylene film, sheet and tubing.

The plant is expected to begin production in May, 1959, according to officials.

Liquor Processing Plant

A new lignin liquor processing plant is now in operation in Appleton, Wis., at Barcon Inc. Barcon is a recently-organized company owned jointly by Consolidated Water Power & Paper Co. of Wisconsin Rapids and Magnet Cove Barium Corp. of Houston, Texas.

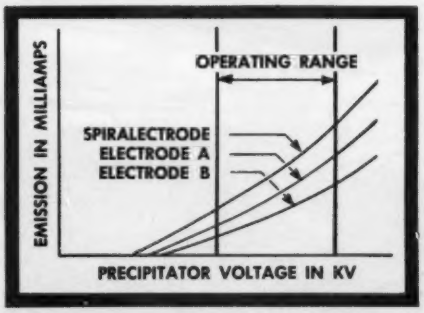
Located on the site of Consolidated's Appleton Division, the plant processes concentrated lignin liquor which is a by-product of Consolidated's sulfite operations. The process

1500 miles of Spiralectrodes in Precipitator Service!

That's real proof of superior performance. Over 1500 miles of these emitting electrodes have been installed in 'SF' electric precipitators . . . delivering 50 to 100% more electron emission than conventional types of electrodes.

There are sound reasons why Buell *Spiralectrodes* are providing superior emitting efficiency in actual dust collecting applications.

- *Spiralectrodes* are *"emission engineered"* – pitch and diameter are custom designed for each application . . . of critical importance with high resistivity dust.
- *Spiralectrodes are precision made from stainless steel*– of uniform quality, corrosion-resistant.
- *Spiralectrodes minimize efficiency-loss of dust build-up* –no horizontal surface to collect dust, positive rapping cleans electrodes.
- *Spiralectrodes maintain predetermined tension* – (no weights required) . . . dampen effect of vibration caused by electrical pulsation, thereby minimizing electrode breakage.
- *Spiralectrodes'* controlled area emission stops sparking effect of "point emission."



Above chart illustrates the superior emission of the Spiralectrode: its corona voltage is lower and its emission is higher than other types of emitting electrodes over the entire operating range of industrial precipitator voltage.

The superior operating characteristics of Spiralectrodes contribute to continued high efficiency of Buell 'SF' Precipitators. Detailed information of this and other exclusive features are described in a booklet, "Buell 'SF' Electric Precipitators." Send for your copy: write Dept. 56-D, Buell Engineering Company, Inc., 123 William Street, New York 38, New York.

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

SHOWCASE FOR QUALITY

Producing pulp of uniform brightness, strength and purity is not left to chance at Weyerhaeuser's new Grays Harbor Mill.

Controls are maintained at every processing stage which automatically measure and record temperatures, pressures, chemical proportioning and other vital functions.

And, even as these quality checks set high standards today, Weyerhaeuser research at Grays Harbor and its other mills is leading to new and better processes and products for tomorrow.

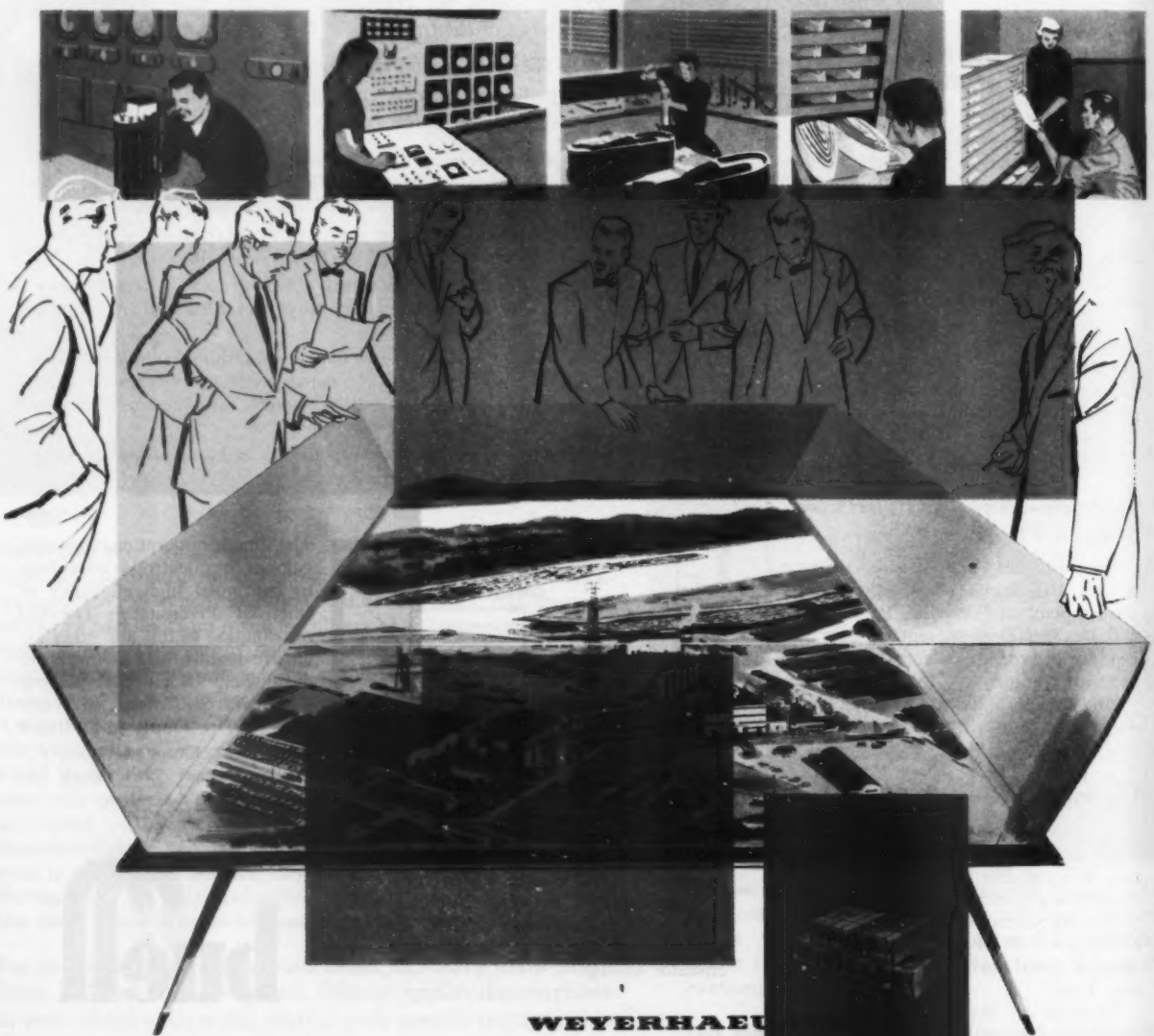
At the filter plant, chemical proportioning and filter cleaning are automatically controlled. Water color, turbidity and other quality factors are checked many times daily.

Each cook in each digester is automatically plotted on charts, dials and flashing lights in the constantly manned digester control room.

Round the clock tests are run on each pulp batch in the main plant laboratory by chemists whose job is to ensure high-quality pulp.

Moisture content and a series of other quality test checks are made every few minutes on pulp as it comes off the drying machine.

Chart room contains process records on all pulp produced.



WEYERHAEU

consists of converting concentrated lignin liquor into useful products in a dry, powdered form. The dried lignin products will then be marketed by Magnet and Consolidated.

Union Carbide Constructs Polyethylene Film Plant

Union Carbide Corp., New York, has announced construction of a plant to make polyethylene film for food wraps and other packaging materials. The plant will be located at Cartersville, Ga.

Carbide officials said the plant will be operated by its Visking division, which makes finished polyethylene film products. Union Carbide Plastics Co., another division, makes polyethylene resin—raw material for the film. The plant is scheduled for completion in July.

Hawthorne Buys Southern Mill

Hawthorne Paper Co., Kalamazoo, Mich., announces that one of its wholly-owned subsidiaries has purchased all of the paper mill properties in Hollywood, Fla., which were formerly owned by Pan American Paper Mills.

The property consists of more than nine acres of land, modern buildings, a 74-in. fourdrinier paper machine, complete beater room machinery and finishing room equipment.

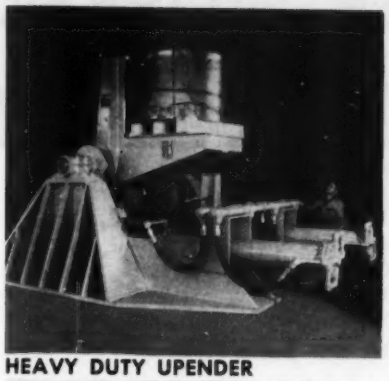
Present equipment will be converted to the manufacture of offset and writing papers as well as 25- and 50-per cent rag content papers.

Allied News Notes . . .

Patton Mfg. Co. Inc. of Springfield, Ohio, will represent two German paper machinery building companies as exclusive sales agent in this country. The two firms are: Bruderhaus Maschinenfabrik of Reutlingen (manufacturers of the Bruderhaus winder, rewinder and suction roll lines); and Strecker-Bruderhaus Co. of Darmstadt-Eberstadt (manufacturers of rotary cutters, automatic pulp baling equipment and refiners).

Black-Clawson Co. has installed two tailored machine tools to increase the capacity and precision of dryer roll production at its Paper Machine Div. in Watertown, N. Y.

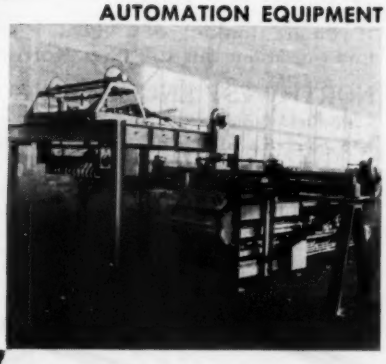
Cameron Machine Co. of Dover, N.J., has announced the opening of a new testing and development de-



HEAVY DUTY UPENDER

LOG & CHIP HANDLING SYSTEM

AUTOMATION EQUIPMENT



PV

FINDS THE ANSWERS

"PV" stands for *Planet Versatility* . . . a quality that has made Planet Corporation known throughout industry as an organization that has solutions to the most perplexing production, materials handling, or automation problems.

Planet Corporation engineers apply uninhibited thinking to problems to find workable solutions that increase efficiency. No job is too big or too difficult . . . Planet's "PV" engineers have automated production lines, built bulk and unit materials handling systems, designed complete foundries, developed the world's only true universal transfer device . . . they are experts, in fact, on all types of special handling and automation machinery, and materials handling equipment.

Let Planet demonstrate how its versatile engineering skill, and production and erection know-how can help you. Discuss your problem with a Planet "PV" engineer . . . *it pays to Plan with Planet.*

1826 SUNSET AVENUE • LANSING, MICHIGAN

A STILL FINER WORKHORSE for the Pulpwood Yard!

Model 25-D

cu. 3/4 yd.

Capacity 18 Ton Crane

In keeping with Northwest's program of constant refinement, Northwest announces a still finer tool—the 25-D, an advanced ¾-yd. machine available as a standard crane, supplemented by an 18-ton lifting crane. This new Northwest in the ¾-yd. class makes many new features available to the paper mill.

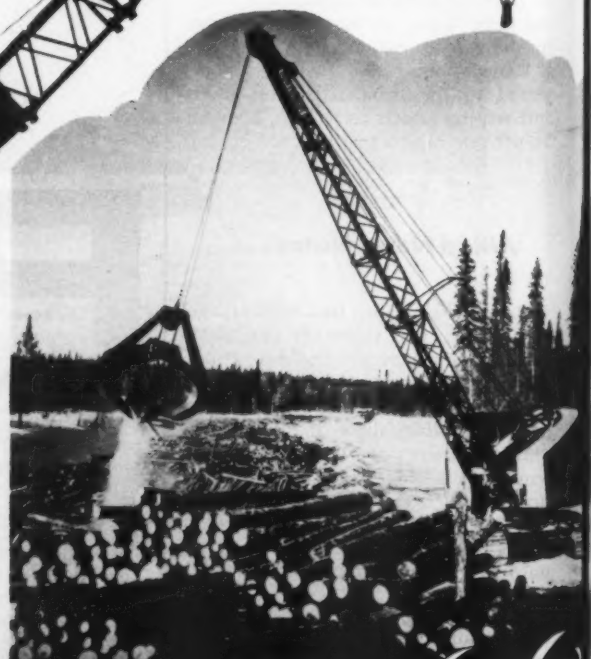
- New Independent High Speed Worm Boom Hoist
- True power load lowering
- Longer, wider crawlers
- Larger drums—greater cable capacity
- Larger Drum Brakes and Clutches
- Larger Uniform Pressure Swing Clutches
- Improved "Feather-Touch" Clutch Control for still easier operation
- Grouped Lubrication

These comprise only a part of the new advances in this workhorse of the ¾-yd. field. Add them to the many other advantages both old and new that Northwest brings you.

If you are thinking of a ¾-yd. machine it will pay you to find out about this still finer Northwest.

NORTHWEST ENGINEERING COMPANY
1508 Field Building
135 South LaSalle Street, Chicago 3, Illinois

Northwest Model 25s have served many of the well-known mills. The 25-D can be counted on for an even greater advance in versatility and output.



NORTHWEST Always Ready to GO

NORTHWEST EQUIPMENT IS BUILT IN THE FOLLOWING SIZES

SHOVELS	CRANES	DRAGLINES	PULLSHOVELS	TRUCK CRANES
¾ Yd. to 2½ Yd. Capacity	13-Ton to 50-Ton Capacity	¾ Yd. to 3 Yd. Capacity	¾ Yd. to 2½ Yd. Capacity	25-Ton and 35-Ton Capacity

partment. It will provide complete facilities for the purpose of establishing, improving and demonstrating techniques and basic methods of slitting, roll production and web control. Cameron has opened the facilities of the new department to all companies with slitting and roll winding problems.

Dow Chemical Co. now has a specially-planned office area featuring a teletype communications center in Boston. The center, which relays customer orders to any Dow manufacturing location in the country via the company's private line teletype network, was designed to provide more effective service to the New England markets.

Reichhold Chemicals Inc. of White Plains, N.Y., announces the creation of a paper division to provide customer service to the pulp and paper industry. William H. Shockley has been named to head the division.

On- or off-machine coating

(Continued from page 24)

is designed with sufficient capacity in excess of the paper machines, or if full running is not anticipated, double coating is readily feasible.

Type of coater

The selection of type and design of coater also may be influenced by the nature of the installation.

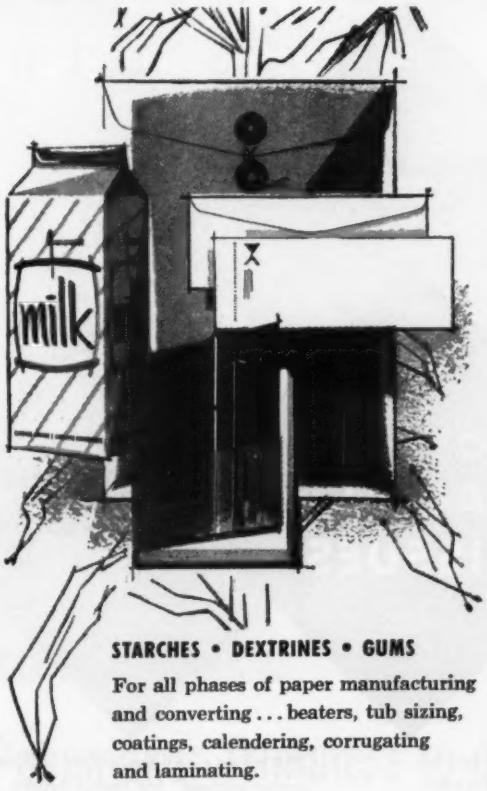
The coating unit for on-machine operation should be capable of applying coating at high solids, say 55 to 65 per cent.

Conventional pigmented coatings of high solids content generally result in better quality and maximum coating weights with a minimum of drying. Also, the application of clear solutions and emulsions of low solids contribute added flexibility in grade structure, particularly in the production of board.

Since coater down-time generally results in paper machine down-time, the coating unit should be simple and rugged in design. The design also should insure low maintenance and rapid adjustment. In addition, the coater should be installed to permit by-passing.

Greater drying capacity is generally possible with off-machine units. Therefore, they more readily tolerate low solids coatings. They also offer many advantages for high solids coatings.

Look what happened to the corn we took off the cob



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For all phases of paper manufacturing and converting . . . beaters, tub sizing, coatings, calendering, corrugating and laminating.

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PHILADELPHIA, PENNSYLVANIA, Bourse Bldg.
NEW ORLEANS, LOUISIANA, 314 Girod Street
LaGRANGE, GEORGIA, 506 Springdale Drive
CHICAGO, ILLINOIS, 750 S. CLINTON

Coating preparation equipment

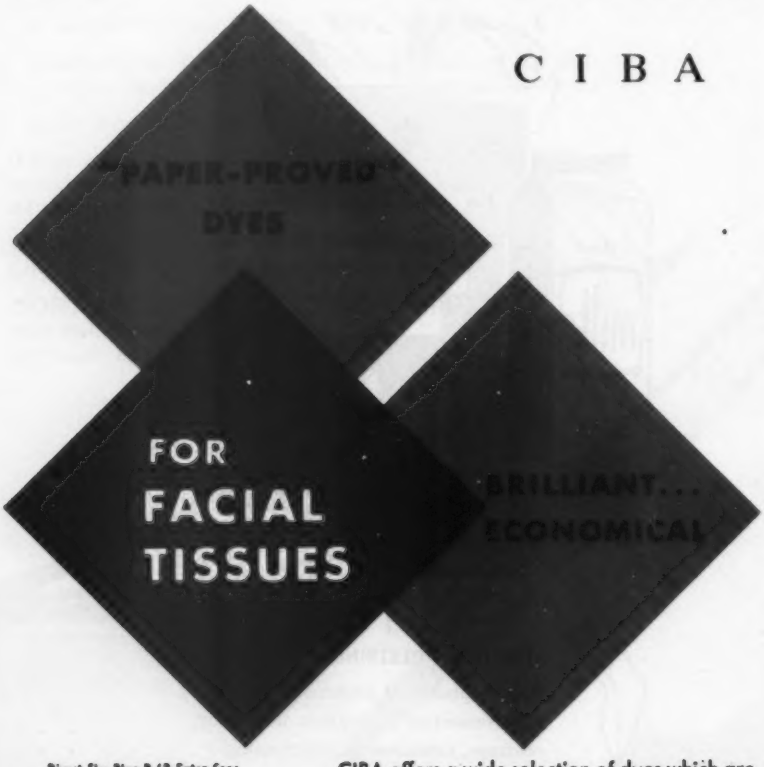
Coating preparation equipment and layout of plant are not affected directly by the nature of the coating installation. However, the system should be adequate and carefully designed. The degree of versatility ultimately required is seldom fully realized initially.

This equipment must have built-in versatility. It must be capable of producing the ultimate in dispersion, uniformity and freedom from contamination. In addition, marked savings in preparation costs can be realized by designing the plant to take full advantage of modern, efficient materials handling systems.

Undoubtedly, there are other factors that should be considered in determining the nature of a coating installation.

In conclusion, I want to make the following suggestion covering an approach that has been most successfully applied at St. Regis:

Set up a small, working, study group representing sales, technical, manufacturing and engineering staffs. Have this group prepare for management consideration a complete report, covering all phases of the contemplated installation. With such information, management can reasonably expect to enter the coating field under optimum conditions of low capital investment, low operating costs, and a highly competitive, quality product.



Direct Sky Blue P-6B Extra Conc.
Chlorantine® Fast Blue P-BGLL
Chlorantine Fast Yellow P-5GLL
Direct Fast Scarlet P-4SWN
Direct Fast Orange P-WS
Direct Green BP
Direct Yellow P-CD
Chlorantine Fast Red P-5B Ex. Conc.
Chlorantine Fast Turquoise P-VLL

CIBA will be pleased to assist in formulating these products for your specific application.

CIBA offers a wide selection of dyes which are "paper-proved" for facial tissues . . . proved under all operating conditions and for fastness characteristics required for this use.

The brilliance and fastness to light of these direct dyes are outstanding . . . and their fastness to crocking and bleeding is excellent too.

Combining high tinctorial strengths and moderate prices per pound, these products bring important economy advantages to the dyeing of facial-grade tissues produced from bleached pulps.

The direct dyes listed at left are a selection of CIBA products recommended specifically for this application.

CIBA Company Inc., Paper Chemicals Department
627 Greenwich Street, New York 14, N. Y.

Coming Events

Tappi

May 25-27—Tenth Coating Conference, Statler Hotel, Boston.
August 17-21—Tenth Testing Conference, Multnomah Hotel, Portland, Ore.
September 9-11—Fundamental Research-Wet Strength Conference, I.P.C., Appleton.
September 15-17—Ninth Corrugated Containers Conference, Jung Hotel, New Orleans.
September 21-23—Fourteenth Paper-Plastics Conference, Edgewater Beach Hotel, Chicago.
October 12-15—Fourteenth Engineering Conference, Penn-Sheraton Hotel, Pittsburgh.
November 4-6—Thirteenth Alkaline Pulping Conference, Robert Meyer Hotel, Jacksonville, Fla.

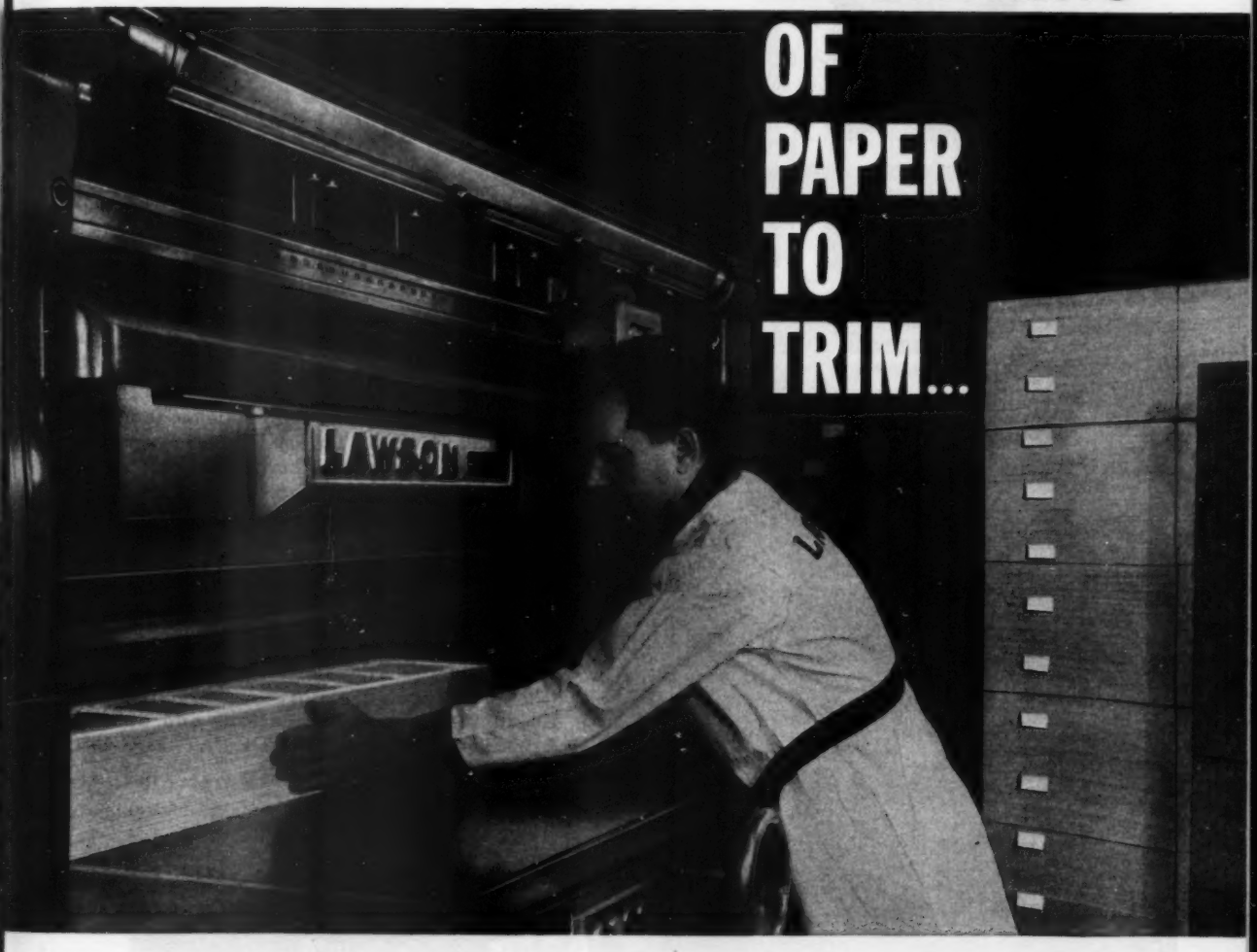
Superintendents Association

April 23—Miami Valley Division, Manchester Hotel, Middletown, Ohio.
May 1-2—Pennsylvania, New Jersey, Delaware Div., Robert Treat Hotel, Newark, N. J.
May 14—Michigan Division, Hotel Harris, Kalamazoo, Mich.
May 21-23—Pacific Coast Division, Joint Meeting with Pacific Coast Section of TAPPI, Gearhart Hotel, Gearhart, Ore.
June 2-4—National Meeting, Shamrock-Hilton, Houston, Texas.
June 12—Miami Valley Division, Piqua Country Club, Piqua, Ohio.

Other Meetings

April 21-28—Netherlands Packaging Exhibition, EUROPAK 1959, RAI Exhibition Halls, Amsterdam, The Netherlands.
April 28—Association of Consulting Chemists & Chemical Engineers Inc. Symposium, Shelburne Hotel, N. Y.
May 6-8—Huyck Felt Co's Felt Workshops, Rensselaer, N. Y.
May 7-8—Cellulose Conference, State University of New York, College of Forestry, Syracuse, N. Y.
May 7—Corrosion Inhibition Symposium, Sponsored by Armour Research Foundation of Illinois Institute of Technology and the Chicago section of the Electrochemical Society, Chicago.
May 10-13—50th Annual F.E.M.A. Convention, New York.
May 17-20—40th National Meeting of the American Institute of Chemical Engineers' Muehlebach Hotel, Kansas City.
May 18-20—Fifth National Symposium on Instrumental Methods of Analysis sponsored by the Instrument Society of America, Hotel Shamrock Hilton, Houston, Texas.
May 25-28—Design Engineering Show, produced by Clapp & Poliak Inc. New York.
May 31-June 5—Annual Industrial Research Conference, Arden House, Columbia's Harriman Campus, Columbia University, New York.

MEN WITH MOUNTAINS OF PAPER TO TRIM...



Rely on big new Lawson Pacemaker Trimmers to do it better

Up to 60% faster and 20% heavier than comparable machines. The new Lawson Pacemaker Hydraulic Clamp Trimmers cut through literally mountains of paper daily... with unmatched accuracy. Easy to operate and maintain.

Electronic Spacer automatically positions the lift with .001" accuracy. Eliminates hand gauging... paces your operator to new production highs.

Adjustable Contour Clamp actually flexes to conform to irregularities in the contour of the pile... assures uniform clamping pressure across the lift. Knife cuts straight and true from top to bottom.

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60"—66"—69"...these big new Lawson Pacemaker Trimmers make all others obsolete. Write or call for full details today.

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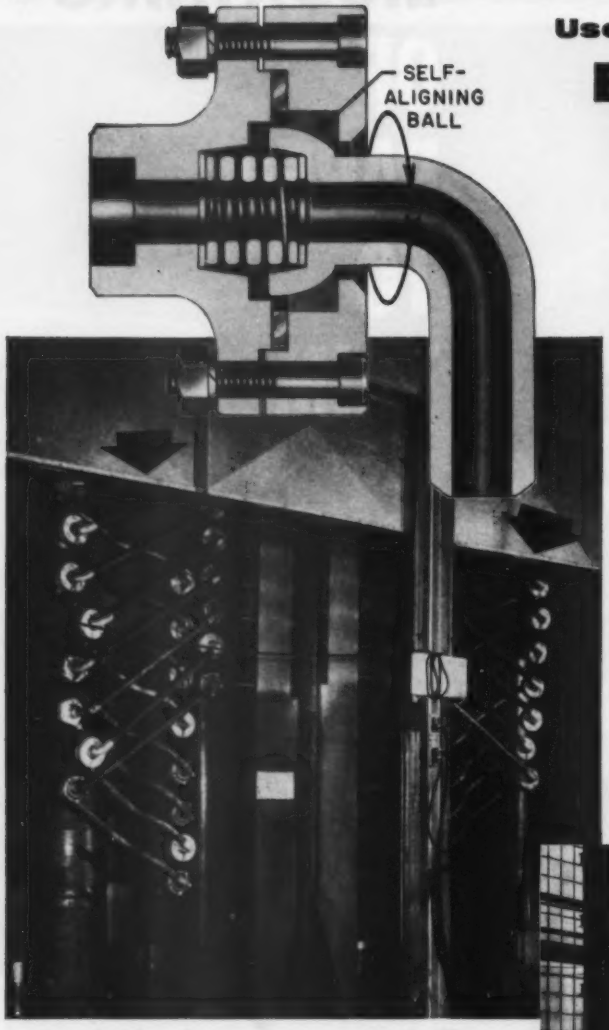
DIVISION OF MIEHLE-GOSS-DEXTER, INC.
CHICAGO 8, ILLINOIS

How to Handle 550 psi Steam Pressure on Multiple Platen Hardboard Presses



Above—A close-up view of 1¼" Barco HTWS Swivel Joints in new hardboard plant of Abitibi Corporation in Alpena, Michigan, on an R. D. Wood Company fifteen platen press. The joints handle 500-550 psi steam, 450°F, twenty-four hours a day.

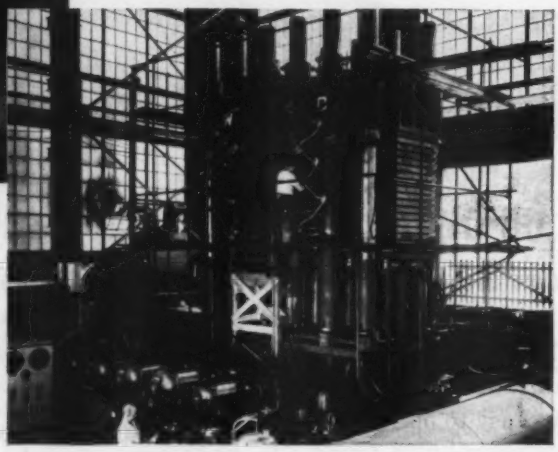
ASK FOR CATALOG 265C

Use New BARCO Series 750 SWIVEL JOINTS

The Barco "Series 750" Swivel Joint is a new development. It is *the key* to solving many PIPING FLEXIBILITY problems where high temperatures and pressures are encountered. Many of these joints are now being used to make flexible "Dog Leg" piping connections for steam supply and condensate drainage of movable platens on giant hardboard presses, as illustrated by the accompanying photographs.

Barco "Series 750" Swivel Joints offer important advantages: (1) Built for 750 psi steam pressure rating—steel construction, hardened ball, stainless steel spring; (2) Choice of seals to handle 500°F, 650°F, or even 1000°F temperature; (3) Ability to stay in service 24 hours a day, 7 days a week, for month after month without maintenance; (4) Compact design, with Barco's distinctive "self-aligning" feature which make for quick, easy, economical pipe fitting; (5) Choice of 90°, 180° or straight body styles with threaded or welding end connections, in a range of sizes.

Engineering recommendations and detailed information on request; ASK FOR CATALOG 265C.



Right—A view in R.D. Wood press building plant showing fitting of a press with Barco Swivel Joints in "Dog Leg" piping connections to platens.

BARCO MANUFACTURING CO.
526E Hough Street • Barrington, Illinois

The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Rotary Joints
In Canada: The Holden Co., Ltd., Montreal

PRODUCTS BACKED BY EXPERIENCE
BARCO
FOUNDED 1908

NAMES in the NEWS

C. T. Waldie

R. D. Glidden

W. D. Hurlbut

J. W. Haley

Waldie Appointed to New Position

Conrad T. Waldie has been appointed to the position of technical assistant to the president of Brown Co., Berlin, N.H.

Waldie's duties will include appraisal and evaluation of reports relative to operations, research and development projects. He will also be a day to day liaison between production and sales.

Associated with Brown Co. since 1952, he has served in various capacities including supervision of Nibroc Towel production and more recently as assistant to the technical director, Dr. George A. Day.

Personal Products Elects Glidden as VP

Robert D. Glidden has been elected vice president in charge of paper operations of Personal Products Corp., Milltown, N.J.

Glidden has been with the company since 1939 and has headed its Cel-Fibe division since its formation in 1955.

Hurlbut Elected VP

William D. Hurlbut has been elected executive vice president of American Paper Exports Inc. American Paper Exports is the export division of International Paper Co., handling export sales in Latin America, Europe, So. Africa and the Far East.

Ranby Appointed by Syracuse College of Forestry

Dr. Bengt G. Ranby has been appointed as the director of the Empire State Paper Research Institute (ESPRI) and as professor of Pulp and Paper Technology at the State University College of Forestry at Syracuse University, Syracuse, N.Y.

Previous to his new appointment, which was effective April 1, 1959, Ranby was research specialist and group leader with the American Viscose Corp. at Marcus Hook, Pa.

Dr. Ranby brings to Syracuse a varied and rich scientific experience, especially in cellulose and paper-fiber chemistry. He is widely recognized as an outstanding authority in the fine structure of the cellulose fiber.

Haley Named Manager of Woodlands

James W. Haley has been named general manager of woodlands for Owens-Illinois Glass Co.'s mill division.

Haley will assume responsibility for the direction of all woodlands functions. He was previously manager of O-I's Big Island, Va. mill.

With headquarters in Jacksonville, Fla., Haley's staff will include George Abel, technical director of forestry, and Charles Nielsen.

Price Promoted at Osborn-Midwest

Osborn-Midwest Paper Corp. of Marion, Ind., has appointed Robert F. Price as executive vice president of the company.

Price joined the company in 1948, and in 1955 he became assistant to the president of the Osborn Paper Co. After the merger of Osborn and Midwest, he continued in this position. He has been responsible for developing new channels of distribution for the company's products, and has contributed many new ideas for product design and improvement.

McCorison Elected President

Thilmany Pulp & Paper Co., Kaukauna, Wis., has elected Guy E. McCorison, formerly vice president-sales, as president. He will succeed E. H. Jennings. Jennings was named chairman of the board to fill the vacancy caused by the retirement of Karl E. Standsbury, who will continue as a director.

C. R. Seaborne, formerly executive vice president, also retired but will continue as a director and consultant. C. L. Dostal continues as vice president in charge of manufacture. H. O. Peters, a vice president and formerly sales division manager in Chicago, succeeds McCorison as vice president-sales. J. T. Thomas, formerly a sales division manager in Detroit, was made vice president in charge of marketing. All directors were reelected, the retiring officers are continuing to serve as directors.

Management Changes at Oxford Paper

Oxford Paper Co. has announced important management changes in connection with its new kraft construction program and the operation of its Rumford Mill.

Harry J. Buncke, vice president, engineering, will be transferred from Rumford, Maine, to the company's executive offices in New York.

Henry P. Petzold has been promoted to the position of assistant to the vice president, Donald Appleton. In this position, Petzold will be located in Rumford and will coordinate the efforts of the various departments of the company involved in the design, construction and start-up of Oxford's new Softwood Kraft Mill.

The position of mill manager of the Rumford mill was given to Charles L. Ferguson. Prior to his new position, he was assistant mill manager since 1955.

Harry B. Conner will serve as assistant mill manager, paper, with overall responsibility for all paper manu-

Sprout-Waldron offers you this free technical literature

REFINERS (96-B) (185)

The precision-built 36-2 "Sprout" (96-B) is the most efficient disc type refiner in quantity of output and in quality of refined pulp per hp. input; available from 400 to 800 hp. The 36-1 S-W Refiner (185) is completely versatile in a wide range of applications; capacities from 75 to 300 hp.

REFINERS, PILOT PLANT (184)

Precision-built for accurate results which can be reliably translated into production figures, and for continuous operation in small commercial plants.

REFINERS, LABORATORY (17-A)

Used for pulping and strength development studies; reproduces end results similar to those obtained from larger refiners.

CONTINUOUS DIGESTER (196)

Creatively engineered system for producing uniform pulp economically. Really two units in one, this S-W Digester is a completely new concept in continuous pulping.

FLAT BED DRAINER (186)

Used for removing free liquor from chips, rejects, and other high freeness materials.

UNIFLOW FEEDER (187)

Developed specifically to meter and maintain a constant feeding rate to the refiner.

LABORATORY MIXER (188)

For research studies involving bleaching, mixing of coating formulas, starch cooking, cold caustic chemical pulping, and others.

FIBERPRESS (190)

Sprout-Waldron/Anderson unit removes large percentage of black liquor and dissolved solids.

STOCK PROPORTIONER (191)

Sprout-Waldron/Cowan unit provides accurate volumetric metering and proportioning of pulps to the paper machine chest.

ROTARY FEEDER VALVE (197)

Assures positive, accurate feeding into pressure vessels; minimizes steam loss; eliminates steam blow-back; reduces hp. requirements.

PULP PELLETING (F-962-A) (F-1042)

These two process flow sheets explain the recently developed Sprout-Waldron pulp pelleting process (F-962-A) and the high density storage system. (F-1042)

CONDENSED CATALOG (183)

A condensed catalog of Sprout-Waldron equipment for the Pulp and Paper industry, including equipment for conveying, mixing and blending, size reduction and classification, pelleting, bulk materials handling.

Send Coupon Today!

- ☐ Bulletin 96-B
- ☐ Bulletin 185
- ☐ Bulletin 184
- ☐ Bulletin 17-A
- ☐ Bulletin 196
- ☐ Bulletin 186
- ☐ Bulletin 187
- ☐ Bulletin 188
- ☐ Bulletin 189
- ☐ Bulletin 190
- ☐ Bulletin 191
- ☐ other equipment _____
- ☐ Bulletin 197
- ☐ Form 962-A
- ☐ Form 1024
- ☐ Bulletin 183

Name and Title _____

Company Name _____

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REFINERS • DIGESTERS • CONVEYORS • FEEDERS • SCREENS • MIXERS • DRAINERS • FIBER PRESSES • STOCK PROPORTIONERS

SP/110

Names in the News . . .

facture, conversion finishing, etc.

Howard P. Waldenmyer will serve as assistant mill manager, pulp, with over-all responsibility for mill wood operations, pulping, bleaching and related activities.

Allied Personalities

The board of directors of Perkins-Goodwin Co. announces that **Louis Calder Jr.** was elected president and chief executive officer of the company. **Louis Calder Sr.** was elected chairman of the board of directors. Louis Calder Sr., previously president of Perkins-Goodwin, recently celebrated his 80th birthday. He has also completed 62 years with the company. He joined the company in 1897 as a $4-a-week office boy and rapidly climbed to the position of president in 1922.

William H. Shockley has been appointed as product sales manager of the Reichhold Chemical Inc.'s paper division.

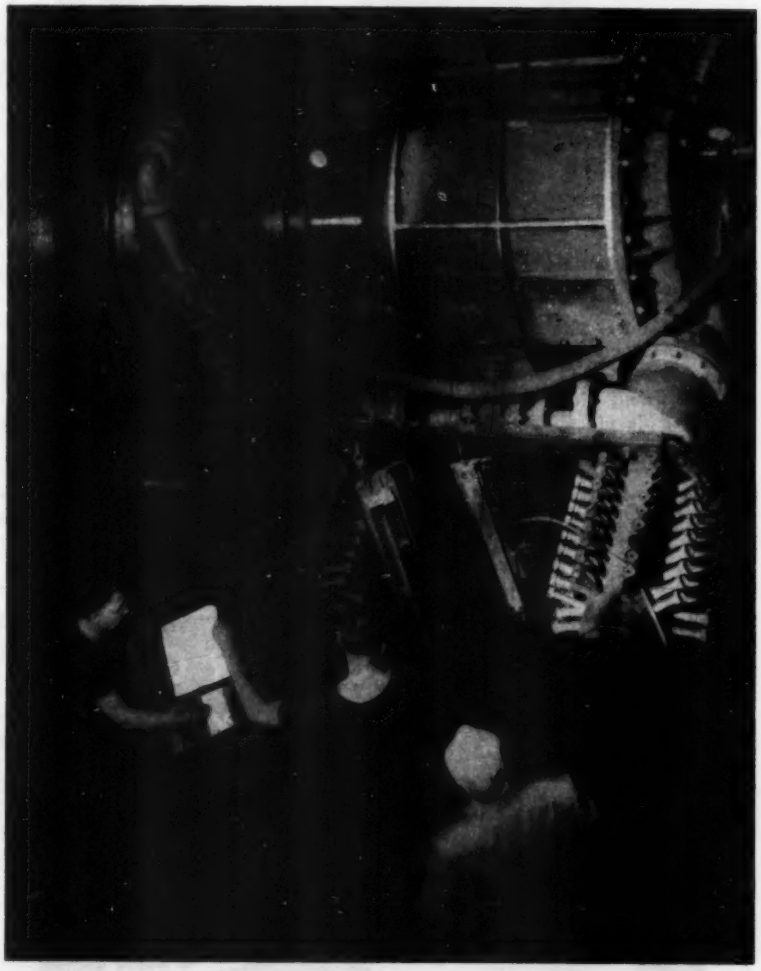
C. E. Ponkey was named president of Layne & Bowler Inc., Memphis, Tenn. He will succeed **W. H. Reeves** who is retiring after serving 52 years with the company. However, Reeves will continue to serve in a consulting capacity.

Everett W. Clem, vice president in charge of engineering for Rice Barton Corp., Worcester, Mass., has resigned from the company after 33 years. He will be retained by the company as a consultant.

Neil F. Putnam has been elected vice president of engineering for Improved Machinery Inc., Nashua, N.H. He has been manager of engineering since 1956.

Black-Clawson Co. of New York has made five promotions and transfers of management personnel in the Paper Machine Div., Shartle Div. and corporate staff. **Otto W. Hein,** vice president, transfers from his position as general manager of the Paper Machine Div., Watertown, N.Y. to the corporate staff as vice president in charge of inter-divisional coordination of plant production, industrial relations and the company-wide capital investment program. **Joseph E. Hartford,** vice president, will be general manager of the Paper Machine Div. He will transfer from his position as

Rated performance of every Nash Vacuum Pump is assured by this precise laboratory test



Rated capacities of Nash Vacuum Pumps are not theoretical. Every Nash Pump is tested individually. Air capacity is determined by delivery thru accurately machined and calibrated orifices. Related vacuum is measured by precise mercury column, and horse power is recorded electro-dynamically. Records of these tests are retained by us, and certified copies are available to Nash Pump owners.

That is one of the reasons why Nash Vacuum Pumps are installed in over a thousand leading Paper Mills. An engineer from Nash will be glad to survey your mill, and make recommendations, entirely without obligation to you.

NASH ENGINEERING COMPANY

440 WILSON ROAD, SO. NORWALK, CONN.

general manager of the Shartle Div., Middletown, Ohio. **Robert F. Vokes,** vice president in charge of administration transfers to the position of general manager of the Shartle Div. **Carl C. Landegger,** assistant general manager of the Paper Machine Div., is appointed a vice president of the company. **Samuel T. Weber,** sales manager of the Paper Machine Div. is appointed a vice president of the company.

Necrology . . .

Theodore A. Cook

Theodore A. Cook, a veteran executive who managed the Charleston mill of West Virginia Pulp & Paper Co. until retiring in 1951, died in February.

Cook joined West Virginia in 1910 as a chemist at the Tyrone, Pa., mill and steadily rose to the executive level. In 1920, he was named assistant superintendent at the Tyrone plant and became plant manager in 1927.

Because of his achievements at Tyrone, Cook was named manager of the Charleston plant in 1937, and supervised its construction. He was elected to the company's board of directors in 1946.

Daniel N. Ohlhues

Daniel N. Ohlhues, a pioneer executive in the corrugated and fiber container industry died in February.

Ohlhues was a co-founder of the Northeastern Container Corp. of Brandford, Pa., in 1932. In 1945, he founded the Champion Container Corp. of Le Roy and served as its president until he retired in 1950.

Louis Bell

Louis Bell, former head of the Newark Paper & Bag Co. Newark, N. J., and president of Waverly & Onyx Building & Loan Association died in February. He retired ten years ago.

Franklin F. Frothingham

Franklin F. Frothingham, former vice president and manager of pulp and paper machinery sales at Bird Machine Co., died in February, a year after his retirement.

For many years he served as manager of the company's midwestern office in Evanston, Ill., before coming to the home office to assume the vice presidency.

Frothingham was at one time chairman of the Association of Pulp and Paper Machinery Manufacturers. He was highly regarded both as a sales executive and for his exceptional understanding of the industry's technical and production problems.

Charles J. Sibler

Charles J. Sibler, chief engineer of West Virginia Pulp & Paper Co. died in March. Associated with the company for 22 years, he had been chief engineer since 1942.

An authority on steam and power, Sibler directed engineering for the paper company's $200 million postwar expansion program which has increased production from 500,000 to more than 1 million tons per year. He introduced a number of advanced engineering techniques in the fields of power, process, recovery and waste treatment.

Numerous articles and a special thesis, written by Sibler have been published in technical magazines and books. He presented a number of papers at engineering meetings, both here and abroad.

Frank Dickson

Frank Dickson, special application engineer and suction equipment specialist in the Paper Machine Division of Black-Clawson Co., Watertown, N. Y., died recently.

He first joined the company as chief engineer of Black-Clawson (Canada) Ltd. in Montreal. Earlier in his career, Dickson was plant engineer at Bowaters newsprint mill, Corner Brook, Newfoundland. Before that, he served with Millspaugh Ltd., Sheffield, Eng., as design engineer.

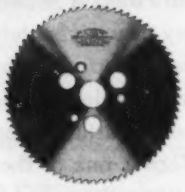
Guerdon L. Dimmick, a retired federal forester, died in March. After joining the U.S. Forest Service in 1934, he served for many years as an inspector for the Civilian Conservation Corps in the North Central Region, headquartered in Milwaukee.

Later on, Dimmick specialized in forest fire control. Upon retiring in 1953, he became a private consultant in business administration.

Emil J. Bergold, pulp superintendent at the Marinette Paper Co., died in February.

Harry Vernon, assistant sales manager for the Champion Paper Co. in New York, died recently.

KEENER EDGE...CLEANER CUT...
LONGER LIFE PER KNIFE...
WITH ATKINS
Silver Steel



CIRCULAR ELECTROTYPE SAWS
Try this saw in your shop. Note the ease and speed with which it cuts. Made of special alloy steel to fit any trimmer. Sizes 5" to 10".

● You save three ways with *Silver Steel* paper knives. They give true, clean cuts—reduce your trimming costs. They spend less time in the grinding shop—reduce your production costs. They give more cuts per blade—reduce your re-tooling costs.

Call your Atkins Distributor now. Ask him to show you why thousands maintain, the finest paper knives made are Atkins *Silver Steel!*

ATKINS SILVER STEEL

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ATKINS SAW DIVISION
Borg-Warner Corporation — Indianapolis 9, Ind.

Mr. P. G.
A BELL RINGER!

Your sheet acquires a finer finish when you use Penford Gums — the adhesive remains in the coating, doesn't penetrate into the sheet. This greater water holding property makes Penford Gums more efficient in applications where adhesive penetration is wasteful.

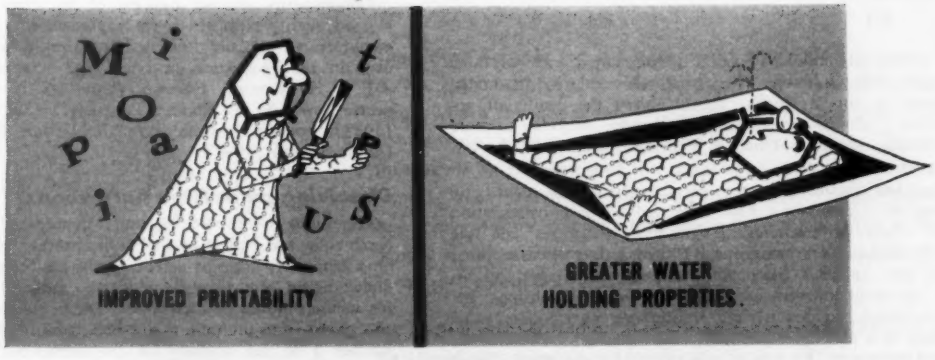
The printability of your sheet is greatly improved, especially with high gloss inks, when Penford Gum is the adhesive in your size press coating. This notable feature is emphasized whether you use Penford Gums alone or with other commonly used film-forming materials.

When you use a Penford Gum for a surface sizing, you will immediately notice a marked difference in your sheet. Call or write Penick and Ford's Technical Service Department for suggestions how you might profit by their use.

Penick Ford

Penford Gums

Leaders in Epoxy Starches



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FOREIGN ABSTRACTS

Viscosity measurements of pulps as a basis for D.P. determinations

The degree of polymerization (D.P.), based on cuam viscosity, was calculated before and after certain chemical modifications, in the case of a series of bleached sulfite pulps. When these were treated with 0.01 molar sodium borohydride, the pulps were stabilized towards alkaline reagents, thus providing a simple procedure for the D.P. determination in alkaline solvents.

Statistical analysis showed a correlation between the copper numbers of these pulps after reduction, whereas, no such relationship was obtained in the case of the original untreated pulps. Furthermore, statistical correlations were also found to exist between the changes in copper number and the corresponding change in D.P. (only when the former change was less than 0.2).

The experimental data and the statistical results both suggest that the treating of pulps with borohydride (0.01*M*) selectively reduces "free" carbonyl groups in the pulps with a negligible reduction of the reducing end groups. However, this selectivity ceases when the concentration of sodium borohydride increases to 0.1*M*.

Eight tables and 13 references are given. ϕ Ellefsen and S. V. Vardheim. *Norsk Skogind* 11, 438-44 (1958), in English.

Cadoxen — a new aqueous solvent for cellulose

This is the simplified name for tri (ethylene diamine) cadmium hydroxide. $[Ca(En)_3][OH]_2$, the preparation of whose solutions is fully described. The solvent, which is colorless, clear and stable seems especially suited to certain studies of pulp fibers. For example, by using Cadoxen, the reactivity of a pulp can be gaged from the rate of solution; its homogeneity can be determined by examining the structure and mass of any insoluble residues; foreign substances in the pulp may be judged from the intensity of the turbidity of the solutions, and color intensity gives some index of such residual material as resins, lignin, etc.

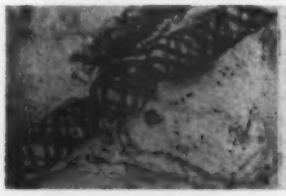

Fig. 1

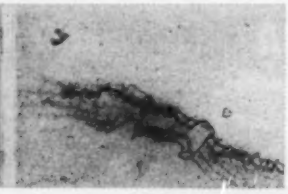

Fig. 2

Fig. 1 shows an unbleached sulfite pulp, stained with safranine and treated with Cadoxen. The structural regularity of undissolved bands is shown clearly. Fig. 2 shows the results of another stained, Cadoxen-treated, unbleached pulp, subjected to more drastic cooking conditions (than in Fig. 1). Various electron micrographs are also given.

The Cadoxen treatment seems especially valuable in identifying those areas of a fiber which have high degrees of polymerization (e.g. the edges of tracheids, longitudinal structures and the presence or absence of a tertiary wall). The author discusses what is termed the "intrinsic color" of the pulp and (based on his Cadoxen spectrophotometric studies) the interrelationships between brightness, light-scattering ability, water retention value and freeness of a pulp.

Eighteen references, 21 figures and two tables are given. Georg Jayme. *Das Papier*, 12, No. 23/24, 626-652 (1958), in German.

Floating tendency of cellulose sheets

Experiments were made to determine whether or not the addition of surface active agents to the alkaline steeping liquors, used in treating dissolving pulps, would reduce the flotation tendencies of such pulp sheets. At the usual concentrations, the various surface active agents showed very slight effects, and both positive and negative effects were noted. The most appreciable effects, noted in the case of the most suitable agents, was actually an increase in (what is termed) "the sinking area" of the pulps, due to a more rapid rate of lye absorption.

Twenty-eight references, five figures and two tables are given. E. Treiber and V. Holta. *Svensk Papperstidn*, 6, 926-930 (1958), in German.

Utilization of reeds in the paper industry

Two articles deal with the possible use of reeds in the pulp and paper industry of the Soviet Union. The first deals largely with the morphology of reed from the Kherson district, and the second gives chemical and technological data, as well as certain aspects dealing with histological studies.

Papermaking investigations were carried out at the Ukrainian Research Institute of the Pulp and Paper Industry.

Reeds cover about five million hectares in Russia and could furnish an annual crop of over 20 million tons. *Phragmites Communis trinuis* is the most common species, growing almost everywhere in the U.S.S.R. *Arundo donax* and *Erianthus purpurasuns* Andi, are species that grow mainly in Central Asia.

The fiber content of Ukrainian reeds varies seasonally and is highest between December and March. It is in this period that the relative amount of stem material increases, and sheaths, leaves and ears show marked relative decreases. Since the weight per volume is low, i.e. 65 kg/cu. meter, the cost of reed transportation is high, and methods for proper bale compression must be developed to make reed utilization more economical. The Ukrainian reeds contain 42-45 per cent cellulose, 27-28 per cent pentosans, 22-24 per cent lignin, 4.7-5.6 per cent ash, 5.7-7 per cent water solubles and about 1.2 per cent other extractives.

There are marked differences between the composition of stems, sheaths and leaves. Of these the stems contain the most cellulose and hemicelluloses, and the least lignin and ash. The sheaths are very high in ash (13.8 per cent), most of which is silica. Kraft cooks indicated that pulps made from the entire plant were inferior in quality, due largely to the sheaths. Such pulps had high silica contents, and showed poor drainage on machine wires. Ash components of the reed are concentrated mainly in the epidermis. Parenchyma tissue also showed poor papermaking properties and tended to form gels when beaten.

Consequently separate pulping of the stems is suggested when a good quality pulp (both for papermaking and viscose) is to be manufactured. Possibly pulps from sheaths and leaves could be used in the production of board and wrapping paper.

F. F. Derbentsev. *Bumazh. Prom*, 33, *No. 3, 4-5;* and Derbentsev and P. B. Kheifets-Polisskaya, *Ibid*, 33, No. 5, 14-15 (1958), both in Russian; through *Abstract Bulletin. Inst. Paper Chem.* 29, 860 (1959).

Dissolving pulps from hardwoods

Digestions were made (using calcium and sodium bases) of beechwood and poplar by the sulfite process; the cooks were made on a laboratory scale to determine the best conditions for avoiding undue lignin condensation, which the author feels is a major factor in the pulping of hardwoods. The degree of such condensation was gaged from the ratio of the bleachability of the pulp ("Küng's number") to the viscosity of the unbleached pulps. Apparently the most complete delignification was obtained with beechwood at 140° C. and nine atmospheres, and with poplar at this temperature under six atmospheres pressure. The total sulfur dioxide concentration was eight per cent, and the liquor contained either 1.1-1.5 per cent calcium oxide or 1.25 per cent sodium hydroxide. The solids to liquor ratio was about 1:4. When impregnation occurred below 110° C., even when the optimum liquor concentra-

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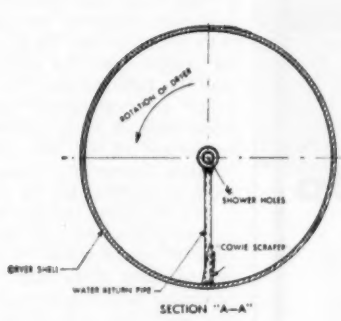
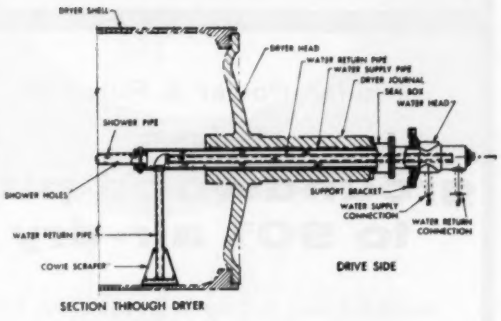


SECTION "A—A"

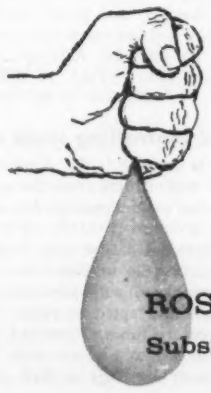


SECTION THROUGH DRYER

remove condensate quickly, completely... allow an even heat transfer from dryer to sheet

Heat transfer to the sheet suffers greatly when condensate accumulates on the inside of the dryer, preventing rimming and causing the condensate to collapse in a cascading effect which require additional steam pressure and increasing drive load as a means of drying the sheet properly. Even after this has been done, not all the paper will be salable due to wet spots and uneven drying. To avoid condensate rimming collapse... and the adverse effect of cascading and to lower production cost, we suggest a Cowie Scraper Syphon Assembly.

The Cowie Scraper is the business end of a rigid stationary syphon. As the dryer rotates, centrifugal force throws the condensate to the edge where the neoprene strip of the Cowie Scraper removes the condensate, evenly scooping it up into the syphon. The thin layer that exists on the inside of the dryer shell is not sufficient to greatly impede heat transfer to the sheet—resulting in considerable steam economy. Maintenance on the Cowie Scraper is minimal. The unit is rigidly mounted to prevent drum scoring and the only revolving part is the steam seal housing.



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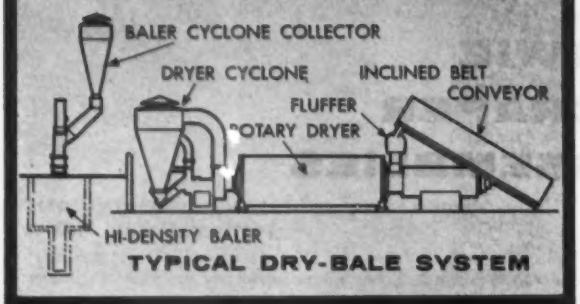

TYPICAL DRY-BALE SYSTEM

Halifax Power & Pulp Ltd.

dries groundwood pulp to 90% air-dry

Halifax Power & Pulp Ltd., using the Dry-Bale system, is now drying groundwood pulp at Sheet Harbor, Nova Scotia. The new system reduces shipping costs . . . saves storage space . . . permits pulp to be shipped to distant markets. The pulp is readily dispersible, requires less handling, and can be stored in warm climates.

An integral part of the new system is the Heil dryer. A stream of hot air carries the fluffed pulp through the dryer . . . fine fibers are quickly dried and carried away, while wetter, heavier fibers move more slowly for longer exposure to the drying medium. Result: uniform drying of all fibers.

Compound showering flights on each of the three drums eliminate surging and provide maximum utilization of the drying medium.

For descriptive literature on the new Dry-Bale system and the Heil dryer, write The Heil Co. or Bauer Bros. Co., Dept. H, Springfield, Ohio.

THE HEIL CO.

(Manufacturers of the Arnold Dryer)

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HEIL PULP DRYER

The 3-pass drum provides 3-stage drying in a single drum with no appreciable deterioration of brightness or fiber strength.

tion was used, the pulps were of inferior quality.

More effective impregnation methods are discussed in the light of lowering the relatively high alkali consumption. Hardwood sulfite pulps retained more pentosans than did spruce pulps, but their alpha cellulose contents were similar.

However, the alpha cellulose content dropped when beechwood was cooked to give pulps whose viscosity fell below 22 centipoises, and with poplar pulps whose viscosity was below 15 centipoises.

Four tables and five references are given. I Slávik. *Papir a celulosa* 13, No. 2, 26-31 (1958) (original in Solvakian); through *Abstract Bulletin, Inst. Paper Chemistry* 29, 580 (1958).

Prehydrolysis in beechwood in kraft pulp manufacture

The chips were prehydrolyzed up to five hours at 150-170°C, and then cooked by the kraft process using 27 per cent sulfidity. The object of this study was to determine the optimum period of prehydrolysis; the solid to liquor ratio in both the hydrolysis and the digestion was 1:3.5. Wood weight losses in prehydrolyzed chips were determined, and in the kraft pulps, determinations were made of alpha cellulose, Küng's hardness number, solubility in 10 and 18 per cent sodium hydroxide and viscosity. With increasing degrees of prehydrolysis (gaged from the loss in weight), both the hardness and the viscosity decreased.

For the usual viscosity range of dissolving pulps, the viscosity of the unbleached pulp showed a linear relationship with the degree of prehydrolysis. With increasing degrees of prehydrolysis, the solubility of the pulp in 10 and 18 per cent sodium hydroxide decreased to a minimum at a wood loss of 23-24 per cent. When the wood loss was greater than this, the alkali solubility again showed an increase. The difference between the solubility in 10 per cent and 18 per cent alkali reached a minimum at a wood weight loss of 18-19 per cent. Thereafter, this difference increased.

In the author's opinion, a determination of the weight loss during prehydrolysis serves as a good criterion for the evaluation of pulp properties. Under relatively mild hydrolysis (with losses up to 12 per cent), the easily-hydrolyzed hemicelluloses are removed and the resulting kraft pulps contain up to 92.5 per cent alpha cellulose. When the loss on prehydrolysis reaches about 18-19 per cent, the pulp alpha increases to over 94 per cent. However, higher weight losses give rise to more beta cellulose, and the bleachability of the pulps suffer.

When high quality viscose is to be manufactured, the loss of wood, on prehydrolysis should be 18-19 per cent. To attain this condition, the chips should be prehydrolyzed four hours at 150° or 15 min. at 170°C.

Fourteen reference, one table and two figures are included. J. Gajdos. *Papir a celulosa,* 13, No. 5, 97-100 (1958); through *Abstract Bulletin Inst. Paper Chemistry,* 29, 871 (1959).

Original in Solvakian, with Russian, German and English summaries.

Trends in waste-paper utilization

This is a lecture on defibration, ranging from relatively simple processes to complicated ones. De-inking plants and modern pulpers, etc. are discussed. The sequences of operations in utilizing waste paper are illustrated and half-tones of equipment are given. The author concludes that by using a suitable pulper, it is possible to separate easily disintegrated waste paper from more resistant material; that re-used paper can be obtained suitably free from specks or dirt, without excessive beating.

Seventeen cuts are included. Reinhold Jacobsen. *Das Papier,* 12, No. 23/24 607-615 (Dec. 1958), in German.

Metering and controlling stock flow

A description is given of two Venturi tubes of Russian construction. One of these differs from the usual models—it is shorter and in place of the usual openings for measuring pressure differences, it has slits arranged circularly on the peripheries of the large and the small diameters of the tube. Either tube can be used for stock velocity metering up to 200 cmh, when stock consistency is up to three per cent, and with pressures up to 6 kg./sq. cm.

These tubes can be adapted to pipes 100-800 mm. in diameter. Both types of venturi tubes, connected to automatic control instruments, were shown to perform well in mill practice. The accuracy of manometer readings at flow velocities of 1 meter/sec.

(or more) and of stock volume control are discussed.

Six figures and four references are given. P. G. Rybakov. *Bumazh. Prom.* 33, No. 7, 6-9 (July 1958), original in Russian; through. *Abstract Bulletin Inst. Paper Chemistry,* 29, 868 (1959).

Determination of phenolic resins in fiber and particle boards

The author assumes that any artificial resins that are lost during a proximate determination must be of little significance in imparting strength or hydrophobic properties to the boards in which they occur, and that the more important ones can be determined with some degree of precision.

The determination involves a modified Klason lignin determination that gives the lignin as well as the significant resins. This mixture is then treated for 1 hr. at 60°C. with acetic acid and sodium chlorite; this dissolves the lignin and leaves resistant artificial resins and some of the wood resins. The latter are removed by extraction with benzene, in which the former are practically insoluble. The resins are then dried and weighed. The method (while far from quantitative) gives fair results, especially in the case of the phenolic resins, which are quite resistant both to solubility in sulfuric acid and in the chlorite solutions. This is less true in the case of the xylenol resins.

Numerous analyses are given that indicate the value and limitations of the method. A table shows the relative solubilities of the various types of resins in the reagents used in the analyses. In the author's opinion, the method is sufficiently precise to furnish data on the more important adhesives in the boards—analyses of many are given.

Ten references and seven tables are included. Karl Seifert, *Holz als Roh-u Werkstoff* 16, 335-40 (1958) (in German with brief English summary).

Effects of chlorides, sulfates and pH on corrosiveness of paper

Degreased and highly-polished steel sheets were wrapped in unbleached kraft paper, which had varying chloride and sulfate contents, and in which the pH varied. The original basis weight of the sheets was 50g./square m.; the experiments were carried out at 92 per cent relative humidity, at 18° ∓ 1°, and for 72-hr. periods. The sheets, prior to use, had been dipped in sodium chloride or sulfate of specific concentrations, and the pH was adjusted by immersion in concentrated formic acid or in aqueous sodium carbonate.

The degree of corrosion was estimated by measuring the total area of rust spots, formed on the paper sheet, with a precision of 0.1 square mm. For a given pH, the corrosive action increased with increased anion concentration. Chloride ions had a more pronounced effect than that of sulfate ions. However the degree of corrosion in the presence of both ions was less than the sum of their individual effects. In the absence of the sulfate and chloride ions, corrosion increased (relatively sightly) with a decrease in pH.

The author concludes that wrapping paper having a pH *not* below five, a chloride content below 0.05 per cent and a sulfate content below 0.25 per cent will not corrode the steel used in these experiments.

Bernard Toker. *Przeglad Papierniczy,* 14, No. 6, 161-3, 171 (June 1958), in Polish with Russian and English summaries. through *Abstr. Bull., Institute of Paper Chemistry,* 29, 856 (1959).

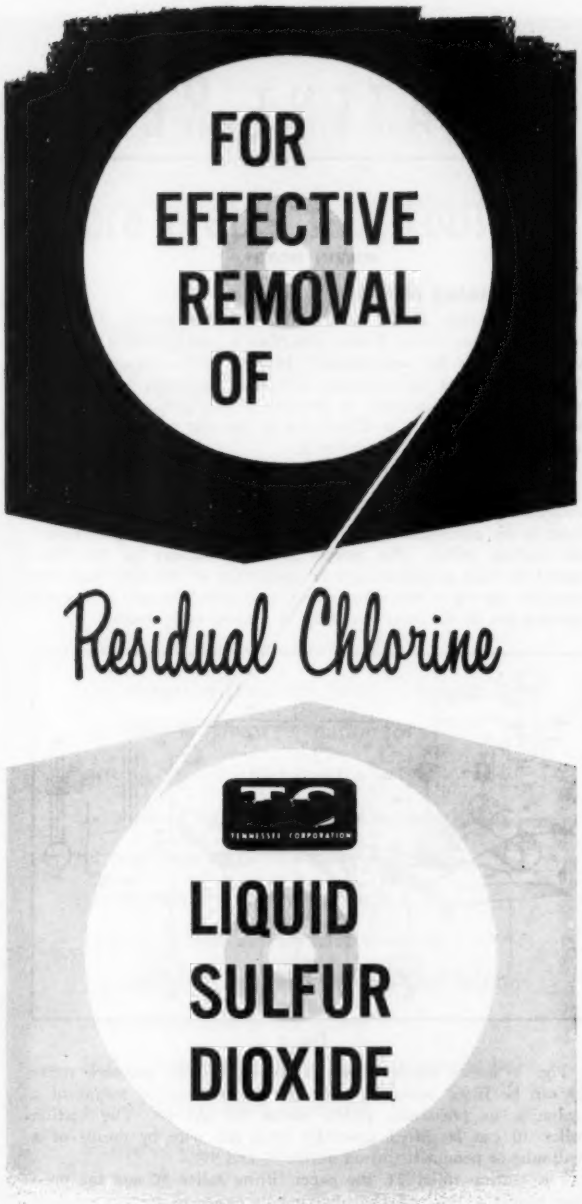
Potentiometric method for determining ripening of viscose

A method was devised for controlling the degree of ripening viscose by means of the "gamma number" which is obtained by a simple potentiometric titration. The determination requires 15 min. (the actual analyst's working time is only 5 min.). Thus a mill control method for the gamma number can be used in place of the Hottenroth number.

When constant operating conditions prevail, the gamma number may be converted into the customary Hottenroth measurement. The potentiometric method for the gamma number gives results nearly identical with those obtained by the diethyl chloroacetamide procedure of Stahn and Matthes.

Agnew Chem., 47, 603 (1934).

Joachim Laub. *Das Papier,* 13, 13-15 (1959), in German.



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PATENT REVIEWS

MELVIN NORD*

Paper making machine

U.S. 2,855,829, issued October 14, 1958, to Martin Allemann and assigned to Sulzer Freres, describes a paper making machine with provisions for automatically lifting the suction roller from the belt whenever an undesired operating condition occurs in the machine (e.g. an increase in pressure in any one of the suction devices through water is drawn out of the wet pulp mat, rendering the suction device inoperative).

With the arrangement according to the invention, the suction roller which is outside of the loop formed by the wire is immediately automatically removed from the wire so that there is no accumulation of wet pulp or paper mat upstream of the suction roller. The system prevents damage to the wire caused by such accumulations or congestion of the wet mass, for example, tearing of the wire or undesired stretching and permanent deformation of the wire resulting in unduly large meshes.

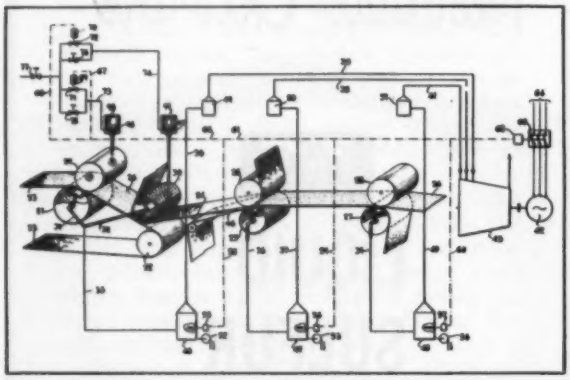

Fig. 1

Fig. 1 shows the machine schematically. The pressure roller 29 can be lifted upwardly from the screen band by means of a hydraulic or pneumatic piston device 96 and 98; The suction roller 30 can be lifted upwardly from the wire by means of a hydraulic or penumatic piston device 97 and 99.

The suction roller 21, the paper lifting roller 30 and the pressure rollers 25 and 27 are connected by means of suction conduits 31 to 35, 36 to 38, and 39 to 41 with a blower 43 which is driven by an ac motor 42. The conduits 35, 38 and 41 are connected to different stages of the blower, so that the different desired suction pressures will prevail in these conduits. A primary water separator 46 is interposed between the conduits 33 and 34, and a secondary water separator 49 is interposed between the conduits 34 and 35.

The water separators take away the water which has been removed from the pulp 24. The water, separated in the main separators 46-48, is removed by pumps 52-54, respectively. Whenever the water level in a primary water separator reaches a predetermined maximum elevation, a switch 65 interposed in the conduits 64 supplying motor 42 with electric energy, is opened by means of control devices 55-57.

At normal operation, i.e. when there is not more water in any of the primary separators than is desired, the valves 71 and 72 are held in closed position by means of the energized solenoids 69 and 70 respectively. The pistons 96 and 97 and the rolls 29 and 30 are in the illustrated lower position due to gravity. The roll 29 presses the mat of paper against the wire screen belt 23, whereas the roll 30 lifts the mat of paper from the belt 23 for transferring the mat of paper to the press portion of the machine.

If the water level in one of the separators 46 to 48 rises above the maximum permissible elevation, the switch 65 (which is actuated by a solenoid 62) is opened and the solenoids 69 and 70 are de-energized, therefy opening the valves 71 and 72 and supplying compressed air into the cylinders 98 and 99 below the pistons 96 and 97, respectively, for lifting the pistons and the rolls 29 and 30.

The mat of paper which is not dried by the roll 21 and other rolls, after the blower 43 has been stopped by opening the switch 65, can now continue to rest on the belt 23 because it is not lifted by the roll 30 and can be guided below the lifted rolls 29 and 30 until it reaches the roller 22, whereupon it drops into a container (not shown). The material may then be brought into a main reservoir from which it is again returned to the process.

*Patent attorney, 17600 Pinehurst, Detroit 21.

Apparatus for treating pulp suspensions

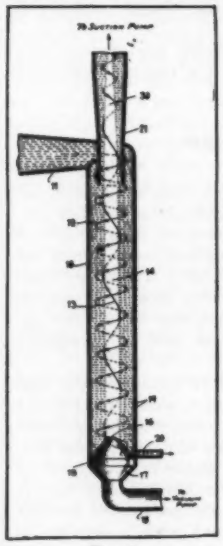

Fig. 2

U. S. 2,849.930, issued September 2, 1958, to Horace Freeman and John D. Boadway and assigned to Nichols Engineering & Research Corp., describes an apparatus for separating gases, vapors and solid particles such as dirt from paper pulp suspensions.

As shown in Fig. 2, the method consists of maintaining a high-velocity vortex of the liquid mixture to be treated, surrounding a core of gas which is maintained at low subatmospheric pressure, so that dissolved gases and any occluded gases are liberated and the resulting bubbles of liberated gas and any bubbles originally present are flung by the action of the centrifugal force of the vortex into the core. Concurrently, if the mixture contains any heavier particles to be separated these are flung to the outer portions of the vortex and may there be discharged in a stream consisting of a small portion of the mixture while the treated liquid is being separately withdrawn at a suitable point after it has been subjected to the vortex action.

In order to secure the formation of a core region free of liquid, symmetrical and of substantial size, it is important to inject the liquid with substantial velocity. For example, at 50 ft or more per second.

Regeneration of spent cooking liquors

U.S. 2,855,272, issued October 7, 1958, to Alfred M. Thomsen, describes a method of regenerating alkali metal salts in spent cooking liquors in such a manner that they pass through the temporary phase of alkali metal cyanides before becoming once more employed as a cooking liquor.

Spent liquor from the Kraft process is evaporated and then dessicated completely, raising the temperature employed to over 500°F. at the close so as to carbonize the organics. In this manner, a very porous and yet coherent product is obtained, consisting of alkali metal salts and carbon, the latter constituting about 40 per cent of the total weight. In order to increase this percentage of carbon, a carbonaceous residue, obtained at a later step in the process, is recycled. The carbonaceous or carbonized product is then subjected to the action of highly-heated nitrogen gas, which is absorbed by the soda salts with the

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Photo by Ewing Galloway, N. Y

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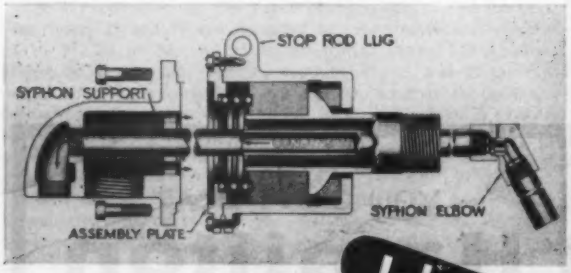

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formation of cyanides, where CO is evolved.

The cyanized mass from the nitrogen treatment step is next cooled and leached with water to yield a solution of alkali metal cyanide and a residue consisting largely of carbon. This residue is in part recycled. The aim and object of such increase of carbon is to present a "dry" mass entirely without stickiness in the nitrogen absorption phase.

The solution of sodium cyanide obtained in the leaching step is next mixed with carbon dioxide. Hydrogen cyanide is evolved and is recovered by compression to the liquid state. The solution now consists largely of a carbonate of the alkali metal used in cooking the pulp with some sulphocyanide which may be ignored or recovered—if it be desirous to save it.

Suction cleaner for doctor blades

U. S. 2,859,537, issued November 11, 1958, to Cecil M. Shockey, provides a suction device for removing the material scraped from the processing rollers by doctor blades in the processing of paper.

A number of suction parts are arranged adjacent the doctor blade, and the vacuum is concentrated progressively from port to port. This minimizes the total suction requirements for the pumping equipment.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Pulp treating system	Riegel Paper Corp.	2,854,894	10/7/58
Removing air from the stock distribution system of a papermaking machine	Rice Barton Corp.	2,854,895	"
Apparatus for molding pulp articles	Diamond Gardner Corp.	2,854,897	"
Self-closing bag	International Minerals & Chemical Corp.	2,855,136	"
Bag with a closing strip	Firm of Marius Jacobsen	2,855,137	"
Bank deposit envelopes	Rockmount Envelope Co.	2,855,138	"
Filter paper folding machine	General Motors Corp.	2,855,830	10/14/58
Apparatus for making bags	W. Inc.	2,855,832	"
Trimmer gate	Minnesota & Ontario Paper Co.	2,856,056	"
Positioning apparatus for steel drums	Jones & Laughlin Steel Corp.	2,856,058	"
Packaging for hypodermic needles	George C. Sparks	2,856,067	"
Shipping and display carton	General Electric Co. et al	2,856,068	"
Carrying device for containers	American Can Co.	2,856,069	"
Egg carton	James W. Lennon et al	2,856,089	"
Carton for frozen foods	Waldorf Paper Products Co.	2,856,114	"
Multiform envelopes	Margaret M. O'Brien	2,856,115	"
Cylinder paper machine assembly	Beloit Iron Works	2,856,825	10/21/58
Machine for forming disposable paper pallets	Martinson Machine Co.	2,856,826	"
Folding display cartons for padlocks	Master Lock Co.	2,857,045	"
Dispensing containers for sheet wrapping material	Dow Chemical Co.	2,857,046	"
Self-locking carriers for cans	Fibreboard Paper Products Corp.	2,857,048	"
Folding paperboard carrier	Continental Can Co. Inc.	2,857,077	"
Paperboard carton	Stone Container Corp. et al	2,857,088	"
Packaging tray	Chicago Carton Co.	2,857,089	"
Container for heavy articles	Crown Zellerbach Corp.	2,857,090	"
Strip-faced case	General Foods Corp.	2,857,091	"
Treatment of wallpaper to impart water-resistance	Societe des Usines Chimiques Rhone-Poulenc	2,857,291	"
Synchronized tail cutter and suction roll travelling sealing strip	Beloit Iron Works	2,857,822	10/28/58
Suction roll silencer	National Research Council	2,857,823	"
Apparatus for dewatering fibrous tubing	Brown Co.	2,857,824	"
Apparatus for making bags	Bemis Bro. Bag Co.	2,857,826	"
Carton	Continental Paper Co.	2,858,013	"
Composite package	Arvey Corp.	2,858,014	"
Memorandum paper tray	Wilson Jones Co.	2,858,016	"
Produce box	Union Bag-Camp Paper Corp.	2,858,058	"
Produce container	Union Bag-Camp Paper Corp.	2,858,059	"
Tear-off closure for containers	Jagenberg-Werke, A. G.	2,858,060	"
Apparatus for wood chip digestion	Condi Engineering Corp.	2,858,211 & 13	"
Wood chip feeders	Condi Engineering Corp.	2,858,212	"

NEW PRODUCTS

These items are numbered for your convenience. Further information on the various products described may be requested at no obligation through our Readers' Service Dept. Use the business reply card in this issue.

Slime-controlling agent

A potent total germicide has recently been developed as a slime-controlling agent for paper manufacturing. Called DIOXCIDE, it is colorless, odorless, non-toxic and non irritating. From the safety angle, it is entirely safe, both internally and externally.

DIOXCIDE is a stable and efficient oxidizing agent. When added to the wet end of a paper-making system, it becomes a constant slime-preventing agent.

Completely miscible in water, it exists everywhere water goes and it kills micro-organisms on contact. DIOXCIDE breaks down all slime deposits made by these micro-organisms and is usually keyed to the rate of 1 lb. per ton of paper.

The company adds that the paper industry will not antagonise sportsmen, because the new DIOXCIDE will not kill fish nor pollute water. *Chemical Research Laboratories of America Inc.*

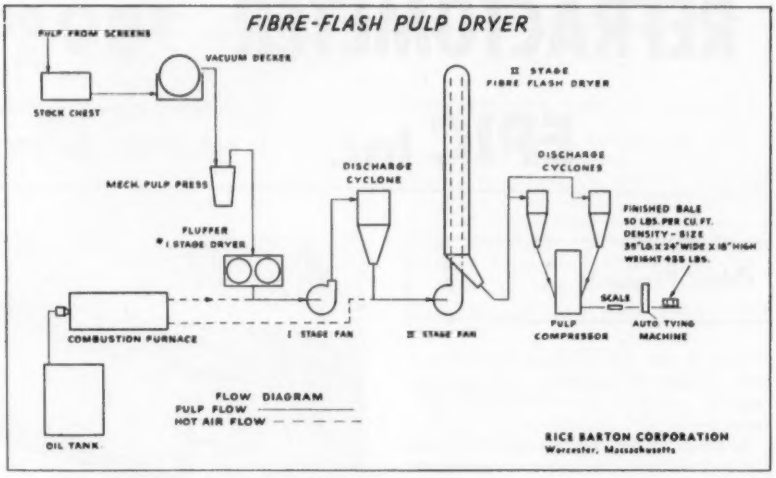
Circle No. 11 on Readers' Service Card

Penetration tester

A new Thwing-Albert Fotosize penetration tester is announced. The new instrument provides an accurate means of determining the time required for the test liquid to penetrate to the point where reflectance of the paper surface is reduced to a definite and predetermined percentage of its original value.

The Fotosize Penetration Tester takes sizing measurement out of the area of human error which is present in subjective visual measurements, even by trained operators. Now, both trained and untrained personnel can obtain accurate and reproductible results. *Thwing-Albert Instrument Co.*

Circle No. 12 on Readers' Service Card



Pulp drying systems

A new pulp drying system, employing the flash-drying principle will be designed and built for use with all types of pulp. Known as the Fiber-Flash drying process, it consists of de-watering the pulp, fiberizing the concentrated pulp material thoroughly to ensure uniform drying, evaporation of the fiber-bound water to the required degree of dryness and baling or bulking the material into convenient form for storage or shipment.

The main advantage of the Fiber-Flash method is reduced freight costs by shipping market pulp dry. Other benefits of this method are: minimum capital investment and operating cost, peak thermal efficiency, reduced labor costs, simplicity of equipment with moving parts at a minimum, eliminating overheating or case-hardening effect, and re-pulping ease. *Rice-Barton Corp.*

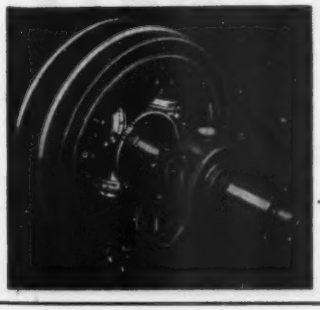
Circle No. 13 on Readers' Service Card

Gelling agent

A new gelling agent that can transform a water-thin solution into a stiff gel instantly or at a predetermined time is now available in commercial quantities.

Known as Cyanogum 41, it is expected to have broad industrial application

STOP TELESCOPING ROLLS • MUSHROOMING CORES



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New Products . . .

because it can gel solutions containing a wide variety of materials, such as clay, charcoal, sawdust and cement-sand mixtures.

It comes in dry, white powder form. It dissolves in water to form a non-viscous solution that will gel in a controllable length of time after adding a catalyst.

In the gelling action, the viscosity of the solution remains essentially that of water until just before a gel is formed. For this reason, Cyanogum 41 can be placed almost anywhere that water can. In a matter of seconds, the gel reaches top strength. *American Cyanamid Co.*

Circle No. 14 on Readers' Service Card

Dextrins

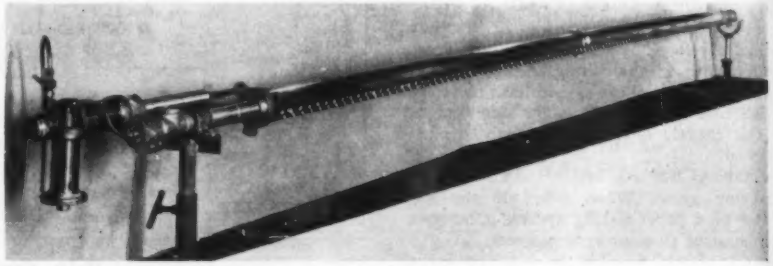
A new process for manufacturing dextrins has recently been patented. The new process "fluidizes" dry powdered starch by air-flow to allow an extremely even distribution of heat and acid to each particle of starch for conversion to dextrin.

According to the company, the conversion is more uniform than with conventional batch dextrinization. Better control of the starch-to-dextrin conversion in the new process results in more uniform dextrins, produced to exacting specifications over the wide range of dextrin requirements.

The new dextrins also tend to be lighter in color and are cleaner because the process is free of localized acidity concentrations which sometimes cause the starch to char in conventional conversion methods.

The new development will be of importance to industries where dextrin cleanliness, light color, uniformity and specification requirements are important. Principal applications are expected to be in the paper industry for coating, bag pastes and prepared adhesives. *A. E. Staley Mfg. Co.*

Circle No. 16 on Readers' Service Card



Fresh water showers

The availability of new oscillating fresh water showers is announced. They are used for the low-cost cleaning of dandys, deckers, cylinders, felts, save-alls, washers, extractor rolls, wires and suction—couch rolls.

These low-volume, high-pressure showers operate on an average of 15 per cent of the volume of water generally used by low-pressure showers. They are individually tailored to meet specific applications. *A. E. Broughton & Co.*

Circle No. 15 on Readers' Service Card

Volumetric flow rate calibrator

A volumetric displacement calibration stand for calibrating small flow devices to accuracies within two-tenths per cent is now

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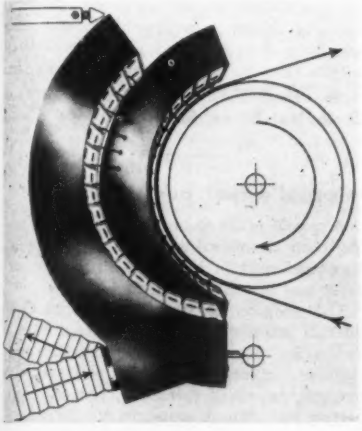
being produced.

In operation, a volume of fluid is accurately measured and automatically timed as it passes through a unit being calibrated, and then into a collecting chamber. The system employs a unique "free-piston" operating in a straight wall precision-bore glass tube as the collecting chamber. A groove around the circumference of the piston is filled with mercury to form a perfect and virtually frictionless seal between the glass tube and the piston.

Some of the advantages of this calibrator are: the elimination of vapor pressure, gas and liquid solubility factors, provision for hermetic sealing, low constant back loading and extremely simple operation. *Brooks Rotameter Co.*

Circle No. 17 on Readers' Service Card



High-velocity air dryer

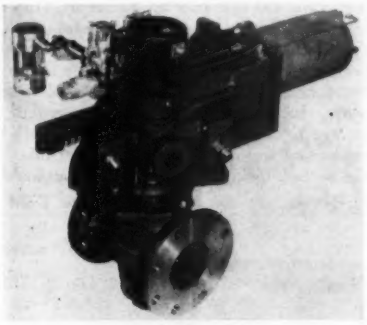
A new SP high-velocity air dryer whose multiple drying heads direct independently regulated air streams against the web is now in production. It increases production, dries the web more uniformly and avoids overdrying.

The new SP dryer can be used for drying pulp, paper and paper board, and for drying coatings applied to these materials. One of these new dryers is said to provide as much drying capacity as several conventional dryers.

Shown in the photo are drying heads, which are curved ducts, installed side by side beneath the dryer roll. They are partitioned by curved dividers into two compartments, one for supply air and one for return air. The air is delivered to the compartment nearest the web and is discharged through slots running parallel to the width of the web. Circular air-return openings are located between the slots and are connected with the outer compartments by interconnecting ducts.

Air is drawn from between the web and the face of the dryer head into the return-air compartment, and delivered to a collecting duct which returns it for reuse to the supply fan and heaters. Maximum recirculation is thus maintained and heating requirements are kept to a minimum. Dryer heads are hinged at one edge so that distance between the high-velocity outlets and the sheet can be varied. *J. O. Ross-Engineering Div., Midland-Ross Corp.*

Circle No. 18 on Readers' Service Card



Weight control valve

A new electric-hydraulic basis weight control valve is now available. It consists of a De Zurik vee-port stock-throttling valve, a cylinder actuator, solenoid valves and a precision-position transmitter. Suitable control stations and position can be furnished to provide very accurate control and read out.

A basis weight control valve is said to offer many advantages over a stuff-gate type installation. By using the basis weight control valve, major source of air entrainment is eliminated, since this system is always full of stock. The machine tender can change the basis weight without leaving his station. Because the basis weight control valve is installed at a much lower level in the system than a conventional stuff-gate, any changes in the stock level at the stuff box will have a lesser effect on the amount of stock delivered. Thus, the result is more uniform basis weight. *De Zurik Corp.*

Circle No. 19 on Readers' Service Card

Polyethylene wax

A new, low-cost, polyethylene wax has been added to Eastman's Epolene line. Known as Epolene LV, this low molecular weight wax was primarily developed as a modifier for paraffin, as an additive for rubber and plastics and as an ingredient in polishes. *Eastman Chemical Products Inc., subsidiary of Eastman Kodak Co.*

Circle No. 20 on Readers' Service Card

Heaters

A new pre-engineered, fully-standardized line of Ross instantaneous heaters has been introduced. Featured is an exclusive, extra-large steam entrance area beyond the tube bundle, that prevents tube damage by impingement and prolonging tube life, says the manufacturer.

Standard construction consists of rugged steel shells, cast-iron bonnets and seamless

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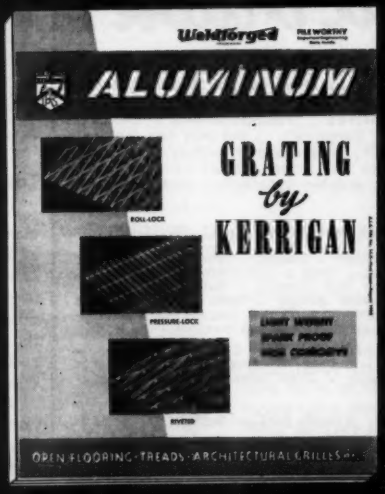

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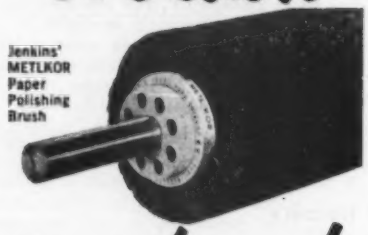

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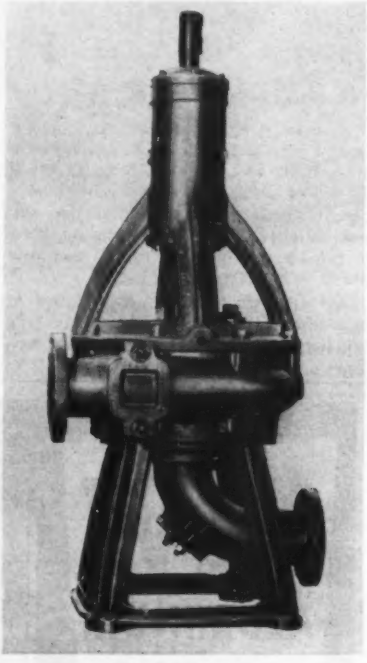
New Products . . .

copper alloy U-tubes. Called Type W-100, the units are of compact, simplified design with removable, pull-through tube bundles.

These heaters come in 128 different sizes with two- and four-pass arrangements, nominal tube lengths up to 10 ft., and shell diameters through 20 in. Ross instantaneous heaters are available for practically every water heating requirement, such as service water, boosters, space heating converters, storage towers and process work. Specially engineered units are built to handle other fluids. *Industrial Div., American Standard.*

Circle No. 21 on Readers' Service Card



Torque-flow solids pump

A new solids pump for pulp and paper manufacturers is now available. Known as the WEMCO torque-flow solids pump, it solves the problem of providing trouble-free pumping of repulped material in a pulping operation without clogging, even though the repulped material may contain such undesirable items as baling wire, rags, bottle caps, rubber gloves, etc.

The pump has an entirely open and clear pump housing. The action of the recessed impeller produces a swirling sucking motion (like a hurricane or whirlpool) in the incoming feed, with the result that solids are carried in the moving mass of liquid with minimized contact with the pump impeller. No critical adjustments are necessary to maintain the pump's working efficiency.

For handling non-corrosive materials, the principal units of the pump are made of cast iron; for handling abrasive materials, Ni-Hard nickel chrome steel and stainless steel are used. Shown in the photo is Type DV WEMCO torque-flow solids pump. *Western Machine Co.*

Circle No. 22 on Readers' Service Card

Wiring duct

A new all-white wiring duct has been developed to match the white interiors of control panels, required by J. I. C. (Joint Industry Conference) and the general industrial trend.

Called Panduct, it provides an improved appearance for the entire panel. Its high-light-reflection permits greater internal visibility, which makes wire installation and tracing easier and also minimizing visual fatigue. This feature reduces installation time, errors and production costs.

The new all-white Panduct is made of polyvinyl chloride plastic, the same durable, non-flammable material used in standard gray Panduct. Since it does not use fiber fillers, it does not invite fungus growth and will not irritate the hands of installers.

Panduct is available in 19 standard sizes ranging from a half-in. sq. to 3 in. × 4 in. It is available in the exclusive Panduit open-slot design as well as closed-slot and wire-hole designs. It comes in standard lengths of 5 ft., but it is also available in 6- or 7-ft. lengths. *Panduit Corp.*

Circle No. 23 on Readers' Service Card

Internal paper additive

A special grade of carboxymethylcellulose has been developed to effect the highest fiber-bonding efficiencies in all grades of paper and board. It is called CMC-IA.

The addition of small amounts of this internal additive, under various conditions, results in: increased crush resistance and stiffness increased. Mullen and tensile strength, improved formation, reduction in beating and refining requirements, increased fold endurance, increased ply bonding, increased tear strength at a given level of Mullen, improved retention of fines and filler, improved wax pick resistance and reduced air resistance. *Virginia Cellulose Dept., Hercules Powder Co.*

Circle No. 24 on Readers' Service Card

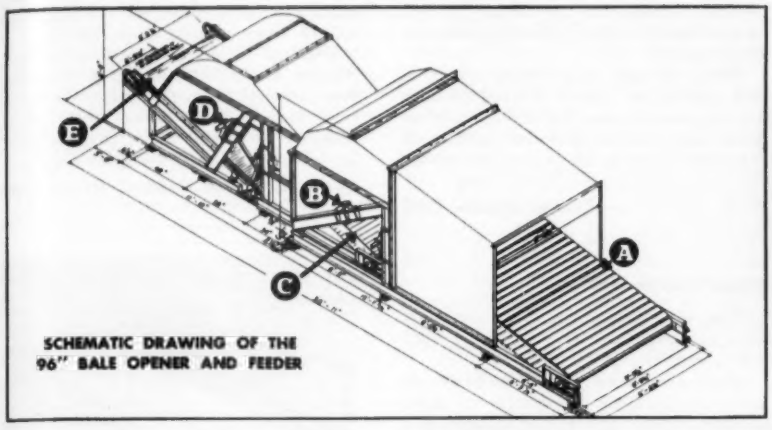
Conveyor belt splice

A new patented method for splicing conveyor and elevator belts that eliminates costly field vulcanizing has been developed. Called the Wedlock Splice, this high-tension mechanical fastener is rated equal to a conventional vulcanized splice for operating tensions up to 700 lbs. per inch of width on belts of over five plies and thicknesses of over ½ in. This new splice provides substantial savings in labor, materials and shut-down expenses. *Manhattan Rubber Div., Raybestos-Manhattan Inc.*

Circle No. 25 on Readers' Service Card

New-type iron for piping

A new metal, called American Ductile Iron, has been developed. It combines the age-old corrosion resistance of cast iron



SCHEMATIC DRAWING OF THE 96" BALE OPENER AND FEEDER

Rag bale opener-feeder

Rag bale opener-feeders which feed and cut 15,000 to 25,000 lbs. of rags per hour, if fed at a steady and uniform rate, are now available.

The unit takes over the bale-opening and cutter-feeding job automatically. It insures the maximum operation of the paper mill and at the same time saves from two to four operators per shift.

Referring to the isometric drawing, the bale is held on a fork-lift truck while the wires are cut and removed. Then it is placed on the feeder conveyor (A) and pushed tightly against the bale ahead.

A revolving cylinder with projecting vanes is carried on shaft (B). These vanes lift the rags from the front of the bale, as it is pushed forward by feeder conveyor (A), and drop the opened rags on the second feed apron (C). This second apron carries the opened rags to a second revolving cylinder carried on shaft (D) which spreads the rags out and delivers them uniformly to the discharge apron (E).

The rags opened and spread out are then either dropped onto the feed conveyor of the cutter, or they may be dropped onto a sorting apron and then to the cutter feed.

The rate of feed is adjusted by the speed of the varispeed motor on the first feed apron (A). The total horsepower of the five motors is approximately 16 hp. *Taylor, Stiles & Co.*

Circle No. 28 on Readers' Service Card

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with mechanical properties similar to those of steel.

Applications include high-pressure pump piping, industrial process piping, piping for high temperature requirements, textile and other industrial rolls, stator shells for electric motors, piston heads for hydraulic assemblies, machine component parts, etc. *American Cast Iron Pipe Co.*

Circle No. 26 on Readers' Service Card

Gum rosin sizes

Three new modified gum rosin sizes are now available. Extensive field tests in paper mills throughout the country indicate that the new sizes have excellent sizing efficiency and effect high brightness in paper.

Developed out of Cyanamid's research in the paper chemicals field, the new sizes —Accobrite 4028 and Cyfor 4029—are shipped as 80 per cent solids and Cyfor 4016A is shipped as 70 per cent solids. Field evaluations show all of the sizes to have low foam characteristics. *American Cyanamid Co.*

Circle No. 27 on Readers' Service Card

Cross cut slitter

A new cross cut slitter has been introduced which incorporates a new idea in skin packaging, perforation and separation. The new unit is actually two identical machines set at right angles to each other.

The first operation is to perforate or knotch the aisles of large sheets of blister or skin packages. Next, the sheets are slit completely through at right angles to the first line of cutting. The result is individual packages, each containing its own product. Blister or skin packages are vacuum-formed from translucent plastic materials.

Main features of the cross cut slitter are automatic feed, self-contained scrap bin for deflected trim, air manifold with pressure regulator and variable speed motor drives. *Appleton Machine Co.*

Circle No. 29 on Readers' Service Card

Front seal gums

A new line of front seal gums, called Rapidex, has been developed to fulfill front seal gumming needs for the latest high-speed envelope machine. The line's rapid drying and fast machining characteristics make it applicable on older envelope equipment, too.

The gum has excellent stability in the gum box and will flow to the rolls without pasting, even after days of agitation. Excellent layflatness and exceptional drying speed also characterize Rapidex gums.

The Fast-Dry type of Rapidex is recommended for the newest high-speed machines and conventional equipment. Flat-Seal Rapi-

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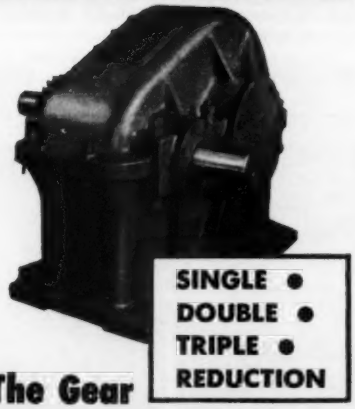

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New Products . . .

dex is recommended where the humidity is low, where extra layflatness is required and for equipment operating at lower speeds. *Morningstar-Paisley Inc.*

Circle No. 30 on Readers' Service Card

Rewind for Cerutti press

A new turnover-type center rewind with electronic web tension control is now standard equipment on the "Model America" Cerutti rotogravure press.

Designed as companion equipment to the Cerutti electronically- controlled duplex turnover unwind, the new rewind (as well as the unwind) unit features semi-automatic flying splicer.

With electronic web tension control at both ends of the "Model America", Cerutti provides accurate metering of the web to the press and precisely-controlled delivery of the printed web to the rewind mechanism. *Parsons & Whittemore Graphic Corp.*

Circle No. 31 on Readers' Service Card

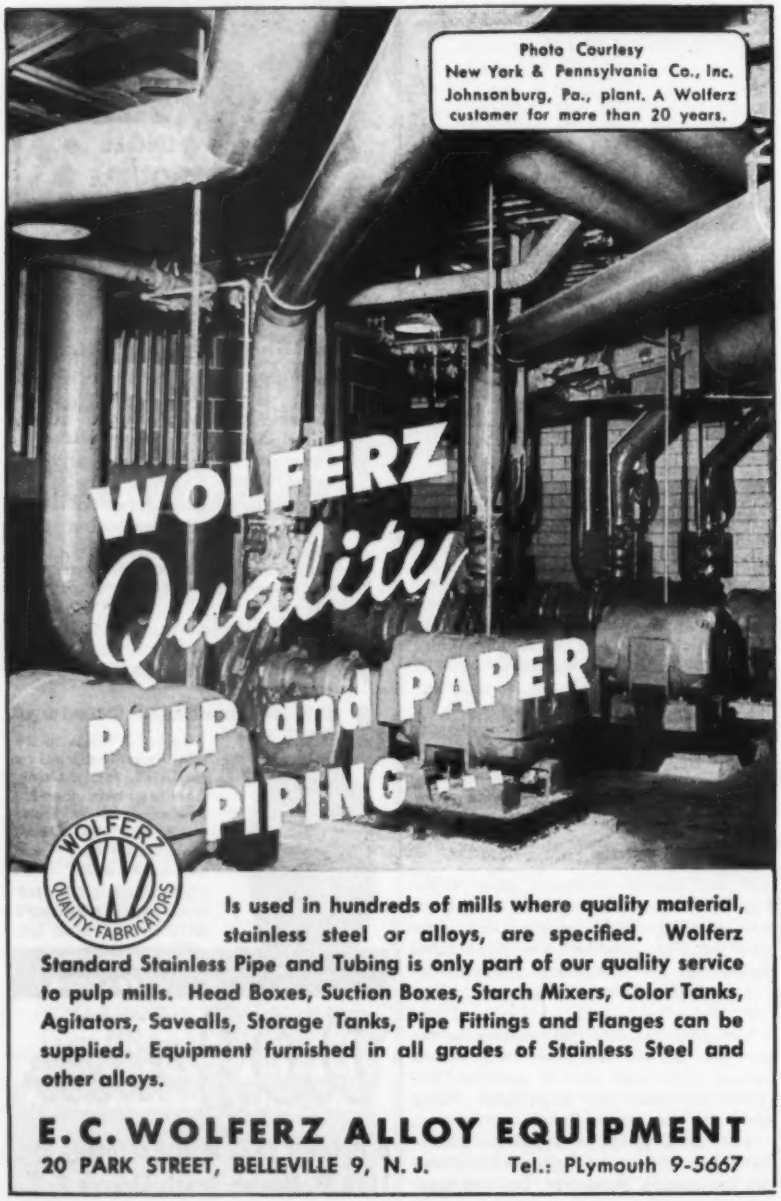
Gear motor drives

Two large 200-hp gear motor drives are now in production. They carry the trade name, Philadelphia GearMotoR.

Their efficiencies range from 94-97 per cent, depending on the number of incorporated reductions. Double, triple and quadruple reductions are available in AGMA ratios ranging up to 440: 1.

Standard NEMA D flanged motors and standard foot-mounted motors are available. Most standard ac motors can be furnished from factory stock. Motors with special features (mechanical or electrical) can also be provided. *Philadelphia Gear Corp.*

Circle No. 32 on Readers' Service Card



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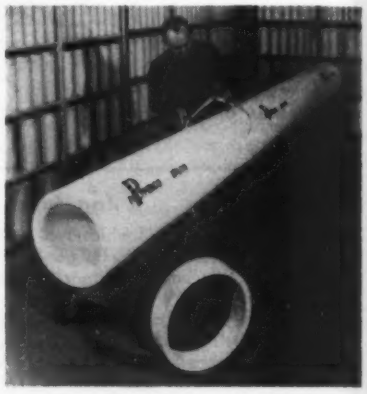


Nylon cylinder

A nylon cylinder, 21-ft. long and weighing over 700-lbs., has been produced. Measuring 16-in. OD and 13-in. ID, it is the largest nylon cylinder ever made, claims the company.

These giant nylon cylinders, which have nylon's unique abrasion resistance, resilience and surface characteristics, are especially suited for use as rollers for embossing, coating or similar processing of paper and other sheet materials.

Cylinders up to 48-in. OD and virtually any wall thickness greater than 1 in. can be made available. *Polymer Corp.*

Circle No. 33 on Readers' Service Card

Expanding core shaft

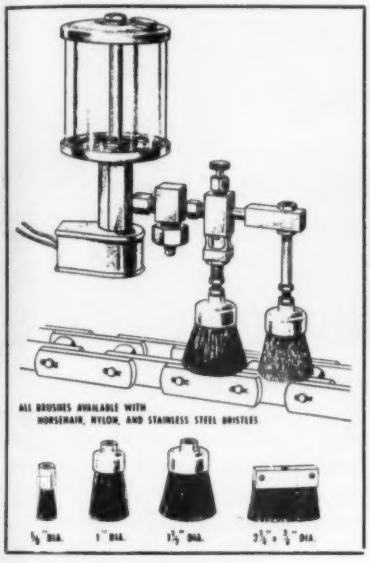
A new expanding core shaft which quickly engages cores for winding and unwinding operations has been introduced.

Trademarked Fairchild, this expanding core shaft uses a heavy rubber tube fastened to a hollow core shaft capable of supporting heavy stock rolls. The rubber tube is incased in a perforated steel sleeve mounted to the core shaft. When expanded by air

pressure, the rubber "bubbles" grip the core securely.

According to reports, these expanding core shafts already in operation, have been proven practical and time saving in application. No moving mechanical parts are used, and all parts can be easily removed for servicing. *Dilts Div., Black-Clawson Co.*

Circle No. 34 on Readers' Service Card



Chain lubricators

A new line of chain lubricating and cleaning brushes for prolonging chain life and reducing costly maintenance, repair and replacement, is announced.

These new brushes have a mechanical bond on the bristles to provide a more secure bristle attachment, prevent bristles from loosening and at the same time improving the wearing qualities of the brushes.

Bristle materials are now available in horsehair for normal applications; nylon for high-speed chains requiring greater wear resistance and stainless steel for high temperature lubrication and chain cleaning.

The bristle material comes in diameters ⅜-, 1-, 1½-in. and ⅜-× 2¼-in. widths.

Cleaning attachments for all types of chains are also available. *Oil-Rite Corp.*

Circle No. 35 on Readers' Service Card

Polyvinylpyrrolidone

A new versatile, low-molecular-weight type of polyvinylpyrrolidone is being marketed in bulk quantities and small packs. Trade-named PVP K-15, it is particularly good as a dispersant to detergent systems and pigment formulations. This product also shows superior colloid action in suspended polymerizations of polyvinyl chloride.

PVP K-15, a white powder, is reportedly very soluble in many organic solvents, as well as in water.

PVP K-15 can be used as a protective colloid for pigments used in paper coatings, inks and paints. With low-bulk-density pigments, PVP can provide high tinctorial strength, dispersion stability and excellent gloss. *Antara Chemicals Div., General Aniline & Film Corp.*

Circle No. 36 on Readers' Service Card

Flat wire belts

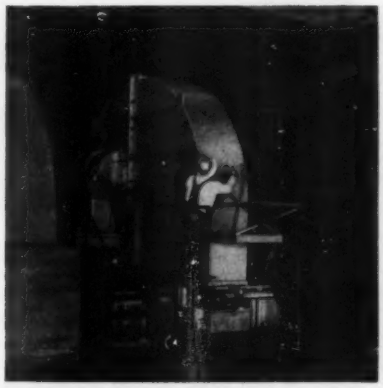
A new series of heavy-duty, flat wire belts has been added to Ashworth Bros. line of metal process belts. They have been designed to increase the utility and application range of their standard weight flat wire series and offer a conveying medium with greater load carrying capacities.

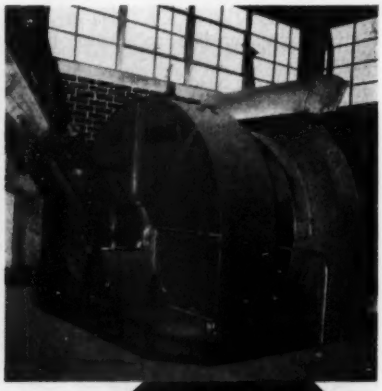
The balanced design of these heavy-duty flat wire belts results in increased belt strength, well proportioned to increased belt weight. Designed for operating on Standard Ashworth's long tooth sprockets, the belts permit easier conversion from standard weight flat wire operation to heavy-duty operation in existing installations. *Ashworth Bros. Inc.*

Circle No. 37 on Readers' Service Card

Mechanical dock leveling ramp

A new versatile, mechanical dock leveling ramp is now on the market. It has a





BETTER CHIPS means BETTER cooking YIELD

- MADE IN DISC DIAMETERS FROM 36" TO 153".
- COMPACT, MURCO ROUND LOG PULPWOOD CHIPPERS REQUIRE LESS FLOOR SPACE.

MURCO Round Log Pulpwood Chippers are designed to include the most desirable features for today's production requirements . . . the result of long and careful study of the various features that contribute to outstanding chipper performance in producing more and better chips at less cost . . . less sawdust, fewer slivers, freedom from repairs yet at the same time having production records of 100 cords or more per hour. The MURCO heavy design construction reduces vibration.

All backed by years of constant development so that each year results in an improved chipper design, the latest of which is MURCO UNI-CHIP that produces more uniform chips with less bruising.

MURCO UNI-CHIP is furnished "when specified" on all new MURCO Chippers — or your present MURCO Chipper can be adapted to it.

MURCO ROUND LOG PULPWOOD CHIPPERS

WRITE for MURCO Chipper booklet.

A complete and detailed story on pulpwood and wastewood chippers . . . specifications of each model . . . yours upon request. Write for it today.

D. J. MURRAY MANUFACTURING CO.
MANUFACTURERS SINCE 1883 • WAUSAU, WISCONSIN

MURCO

"mechanical homing instinct," because it always returns, instantly and automatically, to a locked horizontal position after each use.

When the ramp is in a locked horizontal position, its 6- × 8-ft. platform is at the same level with the surrounding dock area and thereby permits this area to be used for cross-traffic, storage, etc.

That platform can support 20,000 lbs—both for roll-over and cross-over loads. *Globe Hoist Co.*

Circle No. 38 on Readers' Service Card

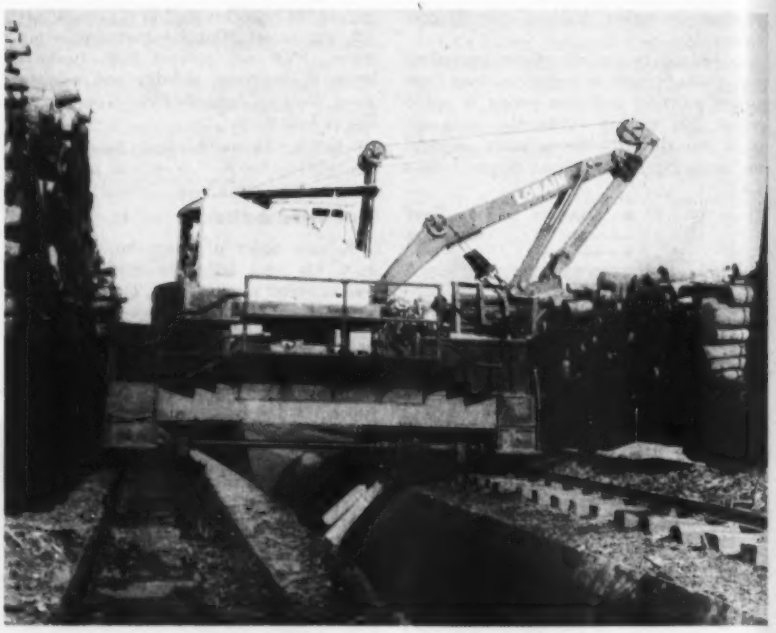
Dry acid cleaner

A new dry acid cleaner, based on sulfamic acid, is announced. Trade-named SUPER-SULFAMIC, it is handled dry and sold in non-returnable polyethylene-lined drums.

This new dry acid cleaner is said to clean industrial equipment more easily and more safely than hydrochloric acid. No fumes are given off whether it is used dry or dissolved in water. Although, it is not as corrosive as hydrochloric acid, it is equally penetrating and effective.

SUPER-SULFAMIC differs from ordinary sulfamic acid in that it is activated for greater attacking power. It is ideal for removing scale and deposits from steam boilers, heat exchangers, air conditioning equipment, etc. *Acid Div., Lee, Revere & Van Buren Chemical Co.*

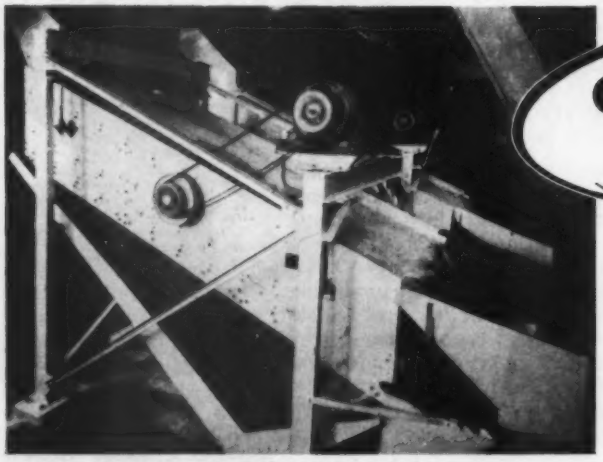
Circle No. 39 on Readers' Service Card



Pulpwood unloading rake

A pulpwood unloading rake, trade-named L-25A Gantry Rake is available. The rake unloads 12-15 rack cars in an eight-hour shift to feed the mill. Straddling either flume or conveyor, it travels up and down under its own power and can unload trains on both sides. Users of this method claim there is less spillage, less car damage and faster unloading than with other methods. *Thew Shovel Co.*

Circle No. 40 on Readers' Service Card



Carthage-Dillon Chip Screens

Full-Floating, Circle-Throw Vibrating Type

•

Complete with woven-wire steel screens of suitable mesh, suspension frame with legs for floor mounting, feed tray, V-belt drive and motor base frame. Also furnished with suspension rods, springs, and brackets arranged for overhead installation.

It will pay you to take advantage of the unique combination of features offered by the Carthage-Dillon chip screen—high capacity, high efficiency, low cost of installation, power and maintenance. There is a complete range of sizes, backed by expert engineering service.

SEND THE COUPON TODAY.

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MACHINE COMPANY
CARTHAGE, NEW YORK

Please send complete information on the Carthage-Dillon Vibrating Chip Screens.

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Firm .....

Street .....

City ..... *Zone* .... *State* .....

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and FULBAR SHELL FILLINGS

Adapta-Plug - a revolutionary advance, this is strongest plug design developed; completely bandless; easiest to strip and fill. Patented.

Fulbar Shell Fillings - rigid, one-piece, with no keys or wedges, saves hours of installation time. Famous Nowave design. Made to fit shell of any Jordan.

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NEW LITERATURE

Books

MAINTENANCE HINTS. Published by Westinghouse Electric Corp., Box 2099, Pittsburgh 30. Pages: 650. Price: $2.00. This 24-chapter, 5 × 7 in., leatherette-bound manual provides a quick, complete and conventional guide to modern maintenance practices on all electrical equipment.

Divided into two sections, the first 17 chapters cover the maintenance of specific apparatus; and the last seven cover general maintenance of materials used in apparatus like insulation.

All chapters in the new manual have been thoroughly revised and updated. The new edition now contains a chapter on static controls maintenance. Chapters covering electronics and electric brakes have been greatly altered and enlarged.

The aim of Westinghouse, with its manual, is to furnish complete information and at the same time keep it general in scope so that it can be applied to all types and makes of electrical equipment.

GROUNDS MAINTENANCE HANDBOOK. Written by Robert S. Conover. Published by F. W. Dodge Corp., 119 W. 40th St., New York, 18. Pages: 501. Price: $10.75.

This comprehensive handbook is reported to be the only publication with complete information on the maintenance of public, semi-public, industrial and private grounds.

Ten chapters treat every important phase of ground maintenance. Over 225 tables, photographs and drawings make this handbook easier to use and more meaningful. A large index makes reference to particular topics easier.

This book is especially helpful to park and highway personnel, landscape architects, contractors, nurserymen, civil engineers and those responsible for tending the grounds of golf courses, resorts and recreational areas, industrial and commercial projects, etc.

Booklets

CORN SYRUPS AND SUGARS is the title of the new and revised edition of a 45-page illustrated booklet, published by Corn Industries Research Foundation Inc. Grouping the products into four major classifications—corn syrups, corn syrup solids, crude corn sugar and dextrose—it covers manufacturing processes, chemical and physical properties, recommended equipment and handling procedures. The booklet also describes the methods that are commonly used in the analytical examination of corn syrups and sugars. The analytical section includes 12 tables and a glossary to help in understanding terms. Free copies of this booklet may be obtained by writing to Corn Industries Research Foundation Inc., 3 E. 45th St., New York 17, or at 1001 Connecticut Ave., N.W., Washington 6, D. C.

USDA Reports

GRADING AND MEASURING HICKORY TREES, LOGS, AND PRODUCTS is another report on the study of utilization of hickory presented by the Hickory Task Force, U. S. Department of Agriculture. This Hickory Task Force Report 7, is prepared by Allan M. Herrick, Dean of School of Forestry, University of Georgia, Athens, Ga. Copies are available from Southeastern Forest Experiment Station, P. O. Box 2570, Asheville, N. C.

CATALOGUE, The Forest Products Laboratory, Forest Service, U. S. Dept. of Agriculture, has issued its semi-annual list of publications (July 1 to December 31, 1958), all of which are listed according to subject matter. This catalog may be obtained by writing to Forest Products Laboratory, Madison 5, Wis.

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

Slitter winders

Black-Clawson Co. is offering a new illustrated 12-page bulletin describing its complete line of converting and mill-type slitter winders. Specifications of each model are given.

Circle No. 41 on Readers' Service Card

Portable elevator

The Association of Lift Truck & Portable Elevator Mfgrs. announces a new booklet titled "The Portable Elevator for Vertical Material Handling." The booklet presents in complete detail exactly what the portable elevator is and illustrates its advantages and applications. Helpful data are given on how to select portable elevators.

Circle No. 42 on Readers' Service Card

Differential pressure transmitter

Yarnall-Waring Co., through its new bulletin, describes the applications, operation construction details, advantages and operating specifications of its newly-developed differential pressure transmitter.

Circle No. 43 on Reader's Service Card

Live storage racks

Lamson Corp. has announced the release of its new four-page bulletin showing a few of its

POSTERS — A POTENT SAFETY TOOL

Posters should be one of the top aids in your safety program. No other safety medium can reach your entire audience—not once, but many times each day—with such low-cost safety messages. They are directed at the worker acts and worker attitudes that lead to accidents. Posters lend *timeliness, repetition and continuity* to your safety program . . . the three fundamental principles of direct selling.

The National Safety Council maintains a stock of posters that covers all industries, operations and phases of safety and health. These posters are produced in two sizes: "A" size, 8½"x 11½", and "B" size, 17x23". Their colorful illustrations and eye-catching captions make them ideal for the mass selling of safety.

Write for a free copy of the Directory of Occupational Safety Posters. This 72 page catalog illustrates 744 posters, indexed and classified for specific operations.

NATIONAL SAFETY COUNCIL
425 N. Michigan Ave.
Chicago 11, Illinois

gravity-type racks available for live storage and order picking applications. Although these gravity racks are usually custom-designed to fulfill a special requirement, the variations are generally only modifications of a few basic designs. Included in the bulletin are several illustrations which demonstrate the applications of various racks to meet specific needs.

Circle No. 44 on Readers' Service Card

Motion piston transmitters

Brooks Rotameter Co. announces the availability of a new bulletin that describes the unusual design features of its motion piston transmitters called Rotameter Flow Rate Transmitters. The 12-page, highly-illustrated bulletin describes these transmitters in building-block style.

Circle No. 45 on Readers' Service Card

A new protein product

Corn Products Sales Co. is offering a new 20-page booklet entitled, "ZEIN—A Versatile Protein for Industry," which describes the characteristics and uses of Argo Brand ZEIN G200. Printed in two colors, the booklet features a glossy cover protected by spirit varnish made with the new alcohol soluble, water dispersible protein. Typical formulations are given for each major application. A glossary of proprietary products used in the system is included.

Circle No. 46 on Readers' Service Card

Syncro-roll discharger

Improved Machinery Inc. is offering a new bulletin which describes its Impco Syncro-roll discharger "for hard to remove stocks." Specifications with a diagram and its principal features are mentioned.

Circle No. 47 on Readers' Service Card

Film on refuse collection & disposal

Dempster Bros. is offering a 15-minute color film, "The New Era of Refuse Collection," on a loan basis for interested plant committees, municipal planning or study groups. Featured is the company's Dempster-Dumpmaster self-loading packer. The film traces the history of refuse collection, and points up many present day problems with animated cartoon sequences and a musical score. Solutions to various problems are filmed on locations in well-known plants and cities.

Circle No. 48 on Readers' Service Card

Jet nozzle shower

A. E. Broughton & Co. has released a brochure which describes its oscillating jet nozzle white water shower. Known as the Broughton 11-WW shower, it is used where white water cleaning is required.

Circle No. 49 on Readers' Service Card

Steam jet ejectors

Southwestern Engineering Co. announces the availability of its bulletin which explains its line of Sweco steam jet ejectors "to meet the vacuum requirements of the power and process industries." One page is devoted to sizes and types of ejectors and four pages consist of two charts using Dalton's laws. The last two pages describe Sweco ejector condensers—inter-condensers (used between ejector stages) and after condensers.

Circle No. 50 on Readers' Service Card

Stainless steel valves

Alloy Steel Products Co. Inc. has published a bulletin containing information on stainless steel valves for corrosive services. The data also provide standards, methods of rating, materials of construction and alloy compositions. It includes design details, illustrates 36 basic valves and describes 40 of their variations.

Circle No. 51 on Readers' Service Card

Grating manual

Klemp Metal Grating Corp. is offering a new 20-page manual designed for the libraries of architects, engineers and plant supervisors. The manual contains data and specifications on the newest safe-load tables for welded and riveted gratings; panel width constant charts; methods of anchoring; comprehensive tables on stair treads, and methods of ordering grating. It also covers the usage of floor armors.

Circle No. 52 on Readers' Service Card

Wire cloth

International Nickel Co. Inc.'s new booklet, Which Inco Nickel Alloy Can Solve Your Cloth Problem? is now available. This fully-illustrated, 15-page booklet describes the physical advantages of wire cloth and indicates the range of weaves and sizes available for various purposes. The mechanical properties of the company's different alloys for making wire cloth and knitted mesh are given with a listing of several products commonly filtered with wire cloth made of those materials. Twenty-three case histories with applications are also included in this booklet.

Circle No. 53 on Readers' Service Card

Aluminum formate powder

Aceto Chemical Co.'s bulletin, which discusses the company's new grade of odorless aluminum formate powder that is used in water-proofing paper and textiles and fixing dyes, is now available.

Circle No. 54 on Readers' Service Card

Oscillating conveyors

Link-Belt Co. has published a new 24-page illustrated booklet devoted to its Flexmount, Coilmount, and Torqmount oscillating conveyors that can handle material from 25-350 tph. Information on trough widths, depths, section lengths, accessories and selection and application data are also included in this book.

Circle No. 55 on Readers' Service Card

Chemical catalog

The Ealing Corp. announces that the new British Drug Houses' catalog on laboratory chemicals is now available. This 336-page B.D.H. catalog furnishes information on 6500 organic and inorganic chemicals, solutions for analytical use, indicators, microscopical stains, resins, dyes, etc.

Circle No. 56 on Readers' Service Card

The Paper Industry
Professional and Business Services

J. E. SIRRINE COMPANY
ENGINEERS Since 1902
GREENVILLE, SOUTH CAROLINA

Design — Consultations
Paper & Pulp — Reports
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We make a specialty of "Ready Dressed" cogs which are READY TO RUN the moment driven and keyed. Write for circular "O" and instruction sheets free.

The N. P. BOWSHER Co., South Bend, Ind.

CLASSIFIED ADVERTISING

WANTED

PERSONNEL, INDUSTRIAL AND PUBLIC RELATIONS MANAGER for pulp and paper company which is building a 500-ton per day average kraft pulp and linerboard mill to be located at Counce, Tennessee. Among qualifications required are: Thorough knowledge and extensive experience in personnel and industrial relations work from Southern kraft pulp and paper industry; age between 35 and 50; should be well informed about labor organizations and negotiations. Will report directly to local officer in charge of complete operation. Position has excellent growth opportunities. Applications will be treated confidential. Only well qualified applicants will be considered.

TENNESSEE RIVER PULP & PAPER COMPANY
230 Park Avenue, New York 17, New York

NEW SLIMICIDE

(tributyl tin oxide complex)

Agents wanted to handle this new slime killer priced at $2.40 per lb. Every mill who have tried this unique material are now regular users. Paper mill personnel may act as agents in spare time. Inquiries will be held confidential. Write Box 672, The Paper Industry.

BOARD MILL CHEMIST — Married, with family. Available immediately. Experienced in mill operations, furnishes, refining, color matching, coatings, printing, new product development and quality control. Write Box 673, The Paper Industry.

GENERAL SUPERINTENDENT

For multimachine Pulp and Paperboard Mill. Good all around executive with substantial high speed board production experience required. This is an excellent opportunity. Reply to Box 677, The Paper Industry.

COATING AND COLOR-MAN WANTED

Experienced coating and color-man with technical background for a bleached kraft food board mill. Excellent opportunities, salary and benefits. Please send resume including education, experience and salary requirements. Write Personnel Manager, American Box Board Co., Filer City, Michigan.

Eight Publications for Papermakers

Pulp and Paper, Volume 1 (Casey)	$18.00
Pulp and Paper, Volume 11 (Casey)	18.00
Paper and Paperboard Making (Williamson)	6.00
Technology of Paper Coating	2.00
Lessons in Papermaking—Part 1	1.50
Lessons in Papermaking—Part 2	1.50
Notes and Observations on Beaters	1.00
Trouble on the Paper Machine	.75

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"WSS" WATER SEPARATOR SNUBBERS

- Silence water-sealed vacuum pump exhausts
- Remove 100% of water from exhaust

Particularly adapted to the paper mill where any content of water in the exhaust gases from vacuum pumps is costly and dangerous. The "WSS" will accommodate water having a percentage of settlings and impurities — convenient clean-outs are provided. Water is removed centrifugally and drained off at the bottom of the unit. Standardly available in sizes from 1¼" to 12". Also models to meet unusual and corrosive conditions, and sizes larger than 12".

Ask for Bulletin No. 270

Sound Engineering

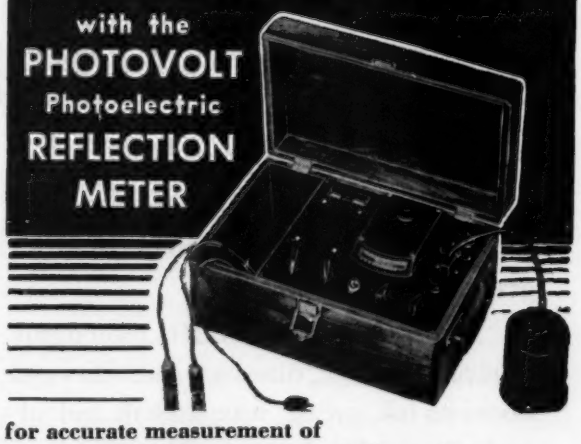
BURGESS-MANNING COMPANY

Industrial Silencer Division

9235 Sovereign Row, Dallas 35, Texas
Libertyville, Illinois

You Can Be Sure!

with the PHOTOVOLT Photoelectric REFLECTION METER



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Brightness and Opacity

of pulp and paper in terms of TAPPI specifications.

Also for *Gloss and Color*

tests on paper, card board, and other paper products.
Portable, reliable, rugged, simple to operate
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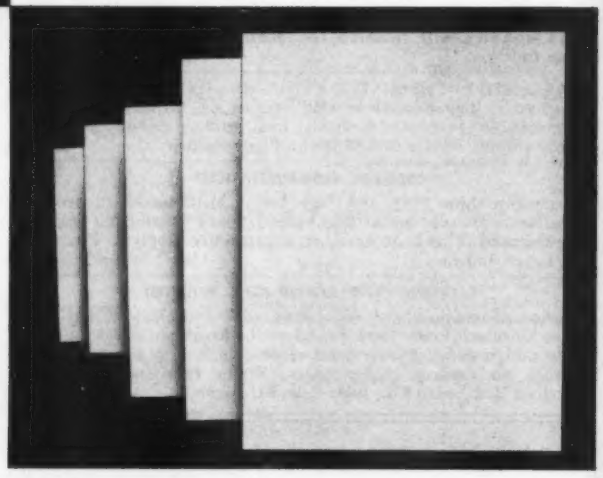
CLEANER PAPER....



WHEN YOU DE-INK WITH...

d-i LESTOIL LIQUID DETERGENT

Yes, d-i LESTOIL assures you of cleaner, more flexible fibers, a cleaner, better quality sheet with more uniform color from all grades of raw stock . . .

. . . because d-i LESTOIL thoroughly wets out the stock, dissolves, emulsifies and disperses ink, grease, wax, asphalt and adhesives . . . makes them miscible with water.

LESTOIL destroys the adhesive qualities of contaminants and prevents their redeposition in fibers, on wires and felts, or elsewhere in the system. d-i LESTOIL keeps your whole system clean and free-flowing . . . the result, a cleaner sheet!

FREE, a generous sample of d-i LESTOIL and full details — yours for the asking. Write today

P.S. d-i LESTOIL is ideal for washing felts, too—on or off the machine.

LESTOIL, INC. HOLYOKE, MASS.
a subsidiary of Adell Chemical Co.

MARKET QUOTATIONS

RAGS (Domestic)

New Cotton Cuttings

The following are brokers' and large dealers' average buying prices for sizeable lots in cents per pound f.o.b. New York:

	per cwt.
No. 1 white shirt cuttings	13.00— 13.50
Soft unbleached muslins	15.50— 16.00
Fancy shirt cuttings	4.50— 5.00
No. 1 percales	5.50— 6.00
No. 1 washables	2.25— 2.50
No. 1 light sileslas	6.50— 7.00
No. 1 light prints	4.75— 5.00
Light flannelettes	6.50— 7.00
Cottonades	2.75— 3.25
Blue overall cuttings	6.75— 7.25
Blue cheviots	6.75— 7.25
Canton flannels, bleached	10.50— 11.00
Canton flannels, unbleached	10.50— 11.00
Osnaburg cuttings	9.50— 10.50
Underwear cuts, bleached	14.50— 15.00
Underwear cuts, unbleached	14.50— 15.00
Sun tan khaki cuttings	5.00— 5.50
American linen cuttings	6.75— 7.25

Cotton Rags

The following are prices, cents per pound, paid by dealers and brokers f.o.b. New York:

	per cwt.
No. 1 roofing (Chicago)	.80— .85
No. 2 roofing (Chicago)	.60— .65
Twos and blues, repacked	1.50— 1.75
Thirds and blues, repacked	1.50— 1.75
No. 1 whites, repacked	—
No. 1 whites miscellaneous	—
No. 2 whites, repacked	—
No. 2 whites, miscellaneous	—

RAGS (Foreign)

(ex dock New York City)

New Rags

per cwt.

New dark cuttings, New mixed cuttings, New light sileslas, Light flannelettes, Unbleached cuttings, New white cuttings, New light oxfords, New light prints — Nominal

Old Rags

per cwt.

No. 1 white linens, No. 2 white linens, No. 3 white linens, No. 4 white linens, No. 1 white cottons, No. 2 white cottons, No. 3 white cottons, No. 4 white cottons, Extra light prints, Ordinary light prints, Medium light prints, Dutch blue cottons, French blue cottons, French blue linens, Checks and blues, Linsey garments, Bark cottons, Old shopperies — Nominal

ROPE and BAGGING

F.o.b. and ex dock New York City

Gunny No. 1, domestic	—
Gunny No. 1, foreign	—
No. 1 manila rope, domestic	—
No. 1 manila rope, foreign	—
New burlap cuts (soft)	—
Sisal strings	—
Mixed strings	—

WASTE PAPER

The following are prices, dollars per net ton, paid by brokers and large dealers for carload quantities of baled stock, f.o.b. cars New York:

No. 1 hard white envelope cuttings	90.00— 95.00
No. 1 hard white shavings	75.00— 80.00
No. 1 soft white shavings	50.00— 55.00
Soft white shavings, uncoated	50.00— 55.00
Fly leaf shavings No. 1	27.50— 30.00
Fly leaf, woody, No. 1	23.00— 25.00
Mixed colored shavings	21.00— 23.00
No. 1 books and magazines	29.00— 30.00
Ledger stock, white, No. 1	52.50— 55.00
Ledger stock colored, No. 1 (Midwest ship)	30.00—
New manila envelope cuttings (free of groundwood)	60.00— 65.00
New manila envelope cuttings (containing groundwood)	50.00— 55.00
Manila tab cards	75.00— 80.00
Colored tab cards	55.00— 60.00
New northern kraft envelope cuttings	65.00— 70.00
Triple sorted kraft, 100%	30.00— 35.00
No. 1 old kraft	30.00—
White news cuts, No. 1	55.00— 60.00
No. 1 overissue news	20.00— 22.00
Folded news, special	18.00— 19.00
Folded news, ordinary	16.00— 17.00
Old corrugated boxes	22.00— 23.00
New jute corrugated cuts	19.00— 20.00
Mill wrappers	11.00— 13.00
Boxboard cuttings	7.00— 9.00
No. 1 mixed paper	7.00— 9.00

CHEMICALS

F.o.b. New York City

Alum, ammonium, Granular, bags, works, cwt.	4.30—
Alum, ammonium, Lump, drums, works, cwt.	5.05—
Alum, ammonium, Powdered, drums, works, cwt.	5.20—
1-Arginine, drums, kilo	90.00—
Blanc Fixe, Direct process, bags, c.l., works, ton	145.00—
Blanc Fixe, L. c. l., ton	155.00—
Bleaching Powder, drums, cwt.	—
Casein, domestic acid precipitated, 30-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.56—
Casein, domestic acid precipitated, 80-mesh bags, 10,000-lb. lots or more, shipping point, lb.	.64—
China Clay, domestic dry-ground, airfloat, 99% 325-mesh bags, c.l., Georgia works, ton	10.00— 12.00
China Clay, 300-mesh bags, c.l., Georgia works, ton	13.50— 14.50
China Clay, Imported, white, lump, bulk, c. l., ex dock Phila, Portland, Me., gross ton	20.00— .35.00
Chlorine, liquid, Tanks, single units, works, freight equaled, cwt.	3.15—
Glycerine, refined (CP, USP) 98%, drums c. l., delivered lb.	.29⅜—
Litharge, commercial powdered, Barrels, c. l., works, freight equaled lb.	.13¼—
Rosin, gum, c. l., f.o.b. New York, cwt., K, M	9.75—
Rosin, gum, N	8.90—
Rosin, gum, WG	9.85—
Rosin, gum, WW	10.40—
Rosin, wood, c. l., f.o.b., shipping point, cwt., K, M	8.20— 8.50
Rosin, wood, N	8.40— 8.70
Rosin, wood, WG	8.75— 8.90
Rosin, wood, WW	9.20—
Saltcake, domestic, bulk works, 100% Na_2SO_4 basis ton	28.00—
Soda Ash, Dense, 58%, paper bags, c.l. works, cwt	1.90—
Soda Ash, Light, 58%, paper bags, c.l. works, cwt	1.85—
Soda, caustic, Flake, 76%, drums, c. l. works, freight equalled, cwt	5.20—
Soda, caustic, Solid, 76%, drums, c. l. works, cwt.	4.80—
Sodium Silicate, 40°Be, 1:3.2, turbid, drums, c. l., works, cwt.	1.55—
Sodium Silicate, 52°Be, turbid, 1:2.4, drums, c. l., works, cwt.	2.65—
Starch, Pearl, 140-lb. bags, cwt.	7.51—
Starch, Pearl, 100-lb. bags, cwt.	7.36—
Starch, Powdered, 100-lb. paper bags, cwt.	7.48—
Sulfur, crude, Bulk, c. l. mine, contract, long ton	23.50—
Talc, Domestic, fibrous, N. Y., grd., bags, c. l. works, ton	28.00—
Talc, Canadian, ground, bags, c. l. works, ton	20.00— 35.00
Titanium Pigment, Calcium-rutile base, regular, bags, c. l., lb.	.09⅜—
Titanium Pigment, High-tinting, drums, c. l., lb.	.14⅜—
Zinc Oxide Pigment, American process, Lead-free, bags, c. l. freight allowed, lb.	.14½—
Zinc Oxide Pigment, Leaded, 35%, bags, c. l., freight allowed, lb.	.15⅛—

WOOD PULP

Quotations on domestic and Canadian pulp, dollars per short air-dry ton delivered consuming mills including basic allowances, follow:

Bleached sulfite, No. 1	155.00—
Bleached sulfite, Canadian	155.00—
Unbleached sulfite	135.00—
Unbleached sulfite, Canadian	135.00—
Bleached soda	150.00—
Bleached soda, Canadian	150.00—
Kraft, bleached hardwood	152.00—
Kraft, bleached	157.00—
Kraft, bleached southern	160.00—
Kraft, bleached Canadian	160.00—167.50
Kraft, unbleached southern	120.00—
Kraft, unbleached, Far West	125.00—
Kraft, unbleached Canadian eastern	135.00—
Kraft, unbleached Canadian western	120.00—125.00
Kraft, semi-bleached southern	140.00—
Sulfite screenings	—
Sulfate screenings	—

Quotations on imported wood pulp, dollars per short air-dry ton on dock American Atlantic ports, follow:

Bleached sulfite, Swedish, freight allowed	155.00—
Bleached sulfite, Norwegian, del'd with limited freight allowance	155.00—
Bleached sulfite, Finnish, freight allowed	155.00—
Unbleached sulfite, Swedish, freight allowed	135.00—
Unbleached sulfite, Finnish, freight allowed	135.00—
Kraft, unbleached, Swedish, freight allowed	125.00—
Kraft, unbleached, Finnish, freight allowed	125.00—
Kraft, bleached, Swedish, on dock	157.50—162.50
Kraft, bleached, Norwegian	155.00—

PAPER

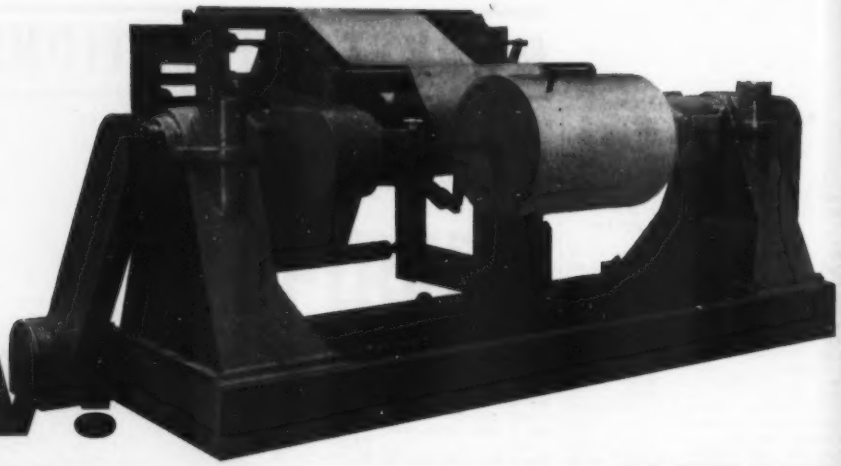
Quotations are mill quotations Chicago

Boards (prices per ton, delivered in Chicago, 10 tons or more): Plain chip	107.50
News vat lined chip	110.00
.009 chip, rolls	100.00
Filled news	111.50
Solid news	114.50
White vat lined chip	144.50
Chip tube and can stock	112.50
Single manila lined chip	162.50
Single jute lined chip	147.50
Container, 42-lb.	
Kraft liner (per 1000 sq. ft.)	2.68
White patent coated .020	175.00
White patent coated .018	177.50
White patent coated .016	182.50

Book Paper (f.o.b. Chicago, c.l. cases per cwt): No. 1 enamels	20.05
No. 2 enamels	19.05
Machine-coated, 45- to 100-lb.	15.05— 18.50
60-lb. + uncoated offset, 25 × 38 (2000 lb.)	17.05
"A" grade English finish untrimmed, 25 × 38 (2000 lb.)	16.15
Rag Content Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons):	per cwt
100% rag	64.70
75% "	49.65
50% "	37.80
25% "	31.90
Rag Content Ledger (white, 5000 to 10,000 lb., ream sealed cartons): 100% rag	65.85
75% "	50.80
50% "	39.00
25% "	33.10
Sulfite Bond (white, 5000 to 10,000-lb. sub 20, ream sealed cartons): No. 1	22.50
No. 2	21.75
No. 4	20.35
Sulfite Ledger (white, 5000 to 10,000-lb., ream sealed cartons): No. 1	23.70
No. 2	22.95
No. 4	21.55

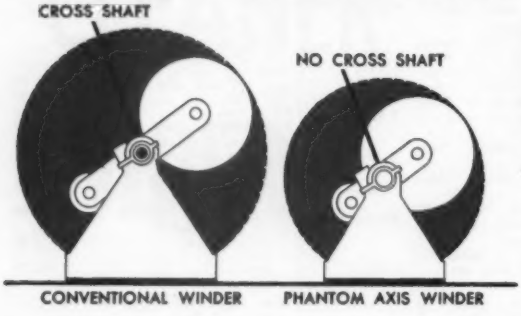
Newsprint (contract base price) per ton	
Rolls, standard	135.00
Sheets	Standard differentials

Kraft Wrapping — Natural (standard rolls 9- and 15-in. diam.)	per cwt
70-lb. and heavier	8.50
60-lb.	8.75
50-lb.	9.00
40-lb.	9.25
35-lb.	9.75
30-lb.	10.50
25-lb.	11.25
20-lb.	12.25
No. 1 Kraft Butcher — Pink	per cwt
40-lb. only	10.00
(Sheets — Plus 50c cwt)	



NEW!

EGAN PHANTOM AXIS TURRET WINDER



ELIMINATION OF CENTER CROSS SHAFT MAKES THE DIFFERENCE...GREATER ROLL DIAMETERS...MORE COMPACT DESIGN...LESS HEIGHT AND FLOOR SPACE

FEATURES

Smooth transfers at full machine speed with unique single motor design

Compact winder design means more rigidity; better operation at high speeds

Speeds in excess of 1000 fpm

Constant or tapered tension

Knife cut-off

Power rotation of turret

Side shifting (automatic or manual) available

Air chucking of cores or shafts (optional)

Web widths through 120"

Write, or phone Randolph 2-0200, for illustrated technical data giving complete information on the new Phantom Axis Winder Series, and its companion unit, The Egan Phantom Axis Turret Unwinder.

Egan

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MODEL AK AUTOMATIC

EXTRA HEAVY DUTY

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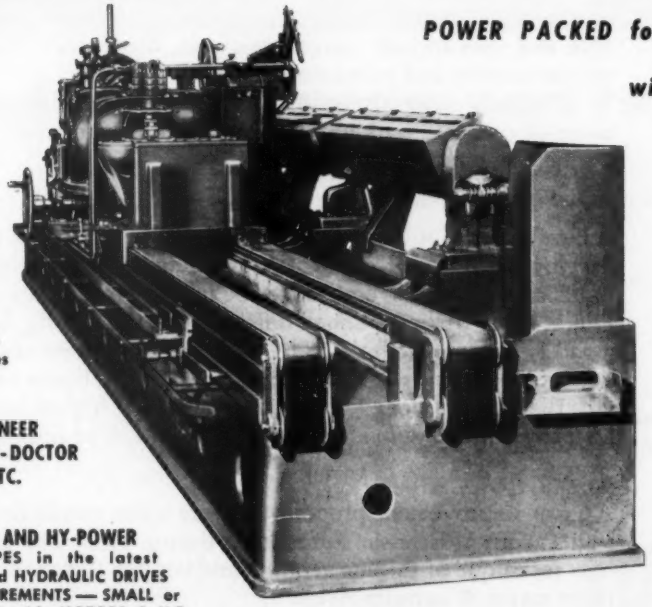

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5 — Longer Knife Life with Less Changes

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Hardwoods controlled by aerial sprays

U S D A scientists have found that the most effective treatment for hardwood control, without damage to the pines, is with a low volatile ester of 2, 4, 5-T, applied in an oil-water emulsion at the rate of five gallons per acre in the late spring. This emulsion contains 10 per cent of 2, 4, 5-T by volume.

The treatment gives effective control of blackjack oak, post oak, black oak and sweetgum; fair to good control of red oak and blackgum; fair control of hickory and white oak, and poor control of red maple and water oak.

C-Z's "Level/smooth"

A new grade of roll and trailing-blade double-coated printing papers will soon be available on the market. These papers of exceptional smoothness will be manufactured on C-Z's new 500-ft. long paper machine at St. Francisville, La. The family of "Level/Smooth" printing papers will include Surfagloss, a double-coated letterpress gloss; Surfalith, a double-coated offset gloss; and Surfamat, a mat-finish, double-coated offset paper.

Kimberly-Clark's Kaycel

Kaycel, a new non-woven fabric, has been successfully used in protective throw-away garments in a number of industrial, medical, and promotional applications.

These applications include a pre-packaged completely disposable obstetrical pack, laboratory or shop coats, jackets, coveralls and aprons. Other possible end uses include covers, rainwear, drop cloth, filtering material, and various novelty and promotional items.

The new material consists of a web of textile fibers bonded between two layers of cellulose wadding. It combines the feel of cloth with the disposability and economy of paper.

Stora Kopparberg's new sulfite pulp

A new bleached sulfite pulp, made from pine wood by a new cooking process developed by Stora Kopparberg, is now available on the market.

The new process entails the cooking of pine, with a sodium base bisulfite liquor, in two stages under different pH conditions. In the first stage the wood is impregnated and partly sulfonated with an almost neutral cooking liquor; the second stage involves the removal of lignin under acid conditions.

Bleaching is done without the traditional hypochlorite stage but with at least two chlorine dioxide stages to prevent loss of fiber strength.

Turbine aeration of natural waters

A great improvement program of river water conditions has been in operation at four Wisconsin sulfite mills during 1958. The program involves the new technique of turbine aeration and has put 1,200 tons of oxygen back into three major Wisconsin rivers.

Yours for Better Fishing!

...and for lower costs, too!

• IN FLOTATION TYPE SAVEALLS—comparative, competitive tests in paper mills throughout the country have established this significant fact—

In the great majority of cases, one of DARLING'S specifically-formulated GLUES has reduced costs, while maintaining or improving flocculating efficiency.

We'd like to work with you in making just such a test in your mill. The entire cost is on us. You've nothing to lose...plenty to gain. You can make arrangements through your Darling sales representative. Or write or call us collect.

• *You can get the same advantages from* DARLING'S *specifically-formulated* GLUE *used as an additive for improved* RETENTION!

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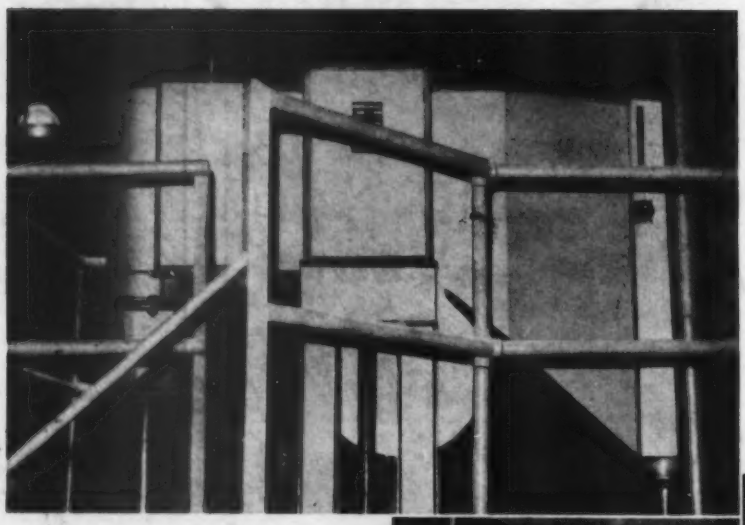
GLUE DIVISION
4201 South Ashland Avenue • Chicago 9, Illinois

DARLING'S improved BONE GLUE

WANT COMPLETE STOCK REGULATION?

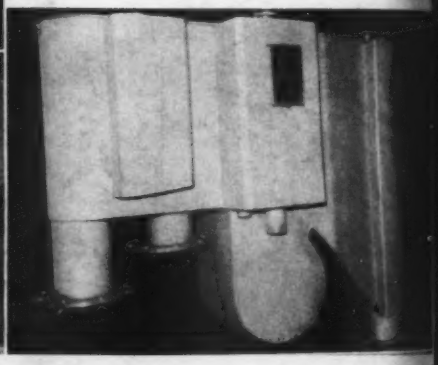
POIRIER COUNTERFLOW CONSISTENCY & BASIS WEIGHT REGULATOR



it regulates VOLUME of stock discharge to maintain BASIS WEIGHT TO WITHIN ?% plus or minus even when stock b comes too light to be controlled b dilution.

THIS MEANS! Incoming consistency c fall below control setting yet the regula will automatically put on stock to maint basis weight.

More yardage per run because light ch can be worked off practically down to t last drop.



Volumetric correction means getting on weight fast and holding basis in the face of consistency variation.
After shut-downs no adjustment required even where chest consistency has varied. The regulator automatically discharges the correct net amount of fiber at the new consistency.

THE COUNTERFLOW IS THE ONLY REGULATOR TRULY MAINTENANCE FREE AND INDEPENDENT OF OUTSIDE ATTACHMENTS - FREE FROM ALL MOVING PARTS - INTRICATE LINKAGES AND MOTORIZED MECHANISMS.

CONSISTENCY controlled to within .1% through the use of the Poirier Equilibrium patent — eliminating conventional dilution valves — providing instantaneous, precise correction at stock discharge.

VOLUMETRIC CORRECTION without moving parts through the Poirier patented Multi-Stuff Gate.

THE COUNTERFLOW is used on all regulating problems from the blow pit to the paper machine — Fourdrinier or Cylinder.

Available with 24 hour recording chart — remote controlled stuff gate.

For complete details on how POIRIER GUARANTEED INSTALLATION will solve your stock controlling problems write to

POIRIER CONTROL COMPANY

SPECIALISTS IN AUTOMATIC PULP STOCK AND VACUUM CONTROLLING EQUIPMENT
WATERVILLE, MAINE